

SEQUENCE LISTING



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<151> 1999-07-27

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<151> 1998-07-27

<150> US 60/125329

<151> 1999-03-19

<160> 196

<170> PatentIn Ver. 2.1

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<213> Streptococcus pneumoniae

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<212> PRT

<213> Streptococcus pneumoniae

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Gly Ile Ser Val Gly Ile Gly His Leu Gln Gly Ser Ser Met Ala Lys
35 40 45
Asn Asn Lys Val Ala Val Val Thr Thr Val Pro Ser Val Ala Glu Gly
50 55 60
Leu Lys Asn Val Asn Gly Val Asn Phe Asp Tyr Lys Asp Glu Ala Ser
65 70 75 80
Ala Lys Glu Ala Ile Lys Glu Glu Lys Leu Lys Gly Tyr Leu Thr Ile
85 90 95
Asp Gln Glu Asp Ser Val Leu Lys Ala Val Tyr His Gly Glu Thr Ser
100 105 110
Leu Glu Asn Gly Ile Lys Phe Glu Val Thr Gly Thr Leu Asn Glu Leu
115 120 125
Gln Asn Gln Leu Asn Arg Ser Thr Ala Ser Leu Ser Gln Glu Gln Glu
130 135 140
Lys Arg Leu Ala Gln Thr Ile Gln Phe Thr Glu Lys Ile Asp Glu Ala
145 150 155 160
Lys Glu Asn Lys Lys Phe Ile Gln Thr Ile Ala Ala Gly Ala Leu Gly
165 170 175
Phe Phe Leu Tyr Met Ile Leu Ile Thr Tyr Ala Gly Val Thr Ala Gln
180 185 190
Glu Val Ala Ser Glu Lys Gly Thr Lys Ile Met Glu Val Val Phe Ser
195 200 205
Ser Ile Arg Ala Ser His Tyr Phe Tyr Ala Arg Met Met Ala Leu Phe
210 215 220
Leu Val Ile Leu Thr His Ile Gly Ile Tyr Val Val Gly Gly Leu Ala
225 230 235 240
Ala Val Leu Leu Phe Lys Asp Leu Pro Phe Leu Ala Gln Ser Gly Ile
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Gly Asp Asn Leu Leu Lys Ile Gly Ser Tyr Ile Pro Phe Ile Ser		
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Thr Phe Phe Met Pro Phe Arg Thr Ile Asn Asp Tyr Ala Gly Gly Ala		
340	345	350
Glu Ala Trp Ile Ser Leu Ala Ile Thr Val Ile Phe Ala Val Val Ala		
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 <213> Streptococcus pneumoniae

<400> 4

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Val	Ile	Ser	Ala	Tyr	Asn	Glu	Glu	Lys	Tyr	Leu	Pro	Gly	Leu	Ile	Glu	35	40	45	
Asp	Leu	Lys	Asn	Gln	Thr	Tyr	Pro	Lys	Glu	Asp	Ile	Glu	Ile	Leu	Phe	50	55	60	
Ile	Asn	Ala	Met	Ser	Thr	Asp	Gly	Thr	Thr	Ala	Ile	Ile	Gln	Gln	Phe	65	70	75	80
Ile	Lys	Glu	Asp	Thr	Glu	Phe	Asn	Ser	Ile	Arg	Leu	Tyr	Asn	Asn	Pro	85	90	95	
Lys	Lys	Asn	Gln	Ala	Ser	Gly	Phe	Asn	Leu	Gly	Val	Lys	His	Ser	Val	100	105	110	
Gly	Asp	Leu	Ile	Leu	Lys	Ile	Asp	Ala	His	Ser	Lys	Val	Thr	Glu	Thr	115	120	125	
Phe	Val	Met	Asn	Asn	Val	Ala	Ile	Ile	Gln	Gln	Gly	Glu	Phe	Val	Cys	130	135	140	
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Thr	Leu	His	Leu	Val	Glu	Glu	Asn	Met	Phe	Gly	Ser	Ser	Ile	Ala	Asn	165	170	175	
Tyr	Arg	Asn	Ser	Ser	Glu	Asp	Arg	Tyr	Val	Ser	Ser	Ile	Phe	His	Gly	180	185	190	
Met	Tyr	Lys	Arg	Glu	Val	Phe	Gln	Lys	Val	Gly	Leu	Val	Asn	Glu	Gln	195	200	205	
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Arg	Pro	Thr	Phe	Lys	Lys	Met	Leu	His	Gln	Lys	Tyr	Ser	Asn	Gly	Leu	245	250	255	
Trp	Ile	Gly	Leu	Thr	Ser	His	Val	Gln	Phe	Lys	Cys	Leu	Ser	Leu	Phe	260	265	270	
His	Tyr	Val	Pro	Cys	Leu	Phe	Val	Leu	Ser	Leu	Val	Phe	Ser	Leu	Ala	275	280	285	
Leu	Leu	Pro	Ile	Thr	Phe	Val	Phe	Ile	Thr	Leu	Leu	Leu	Gly	Ala	Tyr	290	295	300	

Phe Leu Leu Leu Ser Leu Leu Thr Leu Leu Thr Leu Leu Lys His Lys
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Asn Gly Phe Leu Ile Val Met Pro Phe Ile Leu Phe Ser Ile His Phe
325 330 335

Ala Tyr Gly Leu Gly Thr Ile Val Gly Leu Ile Arg Gly Phe Lys Trp
340 345 350

Lys Lys Glu Tyr Lys Arg Thr Ile Ile Tyr Leu Asp Lys Ile Ser Gln
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<212> DNA

<213> Streptococcus pneumoniae

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<212> PRT

<213> Streptococcus pneumoniae

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Thr Gly Ala Gly Ala Phe Ala Tyr Ser Thr Phe Ile Val Lys Pro Glu
35 40 45

Tyr Thr Ser Thr Thr Arg Ile Tyr Val Val Asn Arg Asn Gln Gly Asp
50 55 60

Lys Pro Gly Leu Thr Asn Gln Asp Leu Gln Ala Gly Thr Tyr Leu Val

65	70	75	80
Lys Asp Tyr Arg Glu Ile Ile Leu Ser Gln Asp Val Leu Glu Glu Val	85	90	95
Val Ser Asp Leu Lys Leu Asp Leu Thr Pro Lys Gly Leu Ala Asn Lys	100	105	110
Ile Lys Val Thr Val Pro Val Asp Thr Arg Ile Val Ser Ile Ser Val	115	120	125
Asn Asp Arg Val Pro Glu Glu Ala Ser Arg Ile Ala Asn Ser Leu Arg	130	135	140
Glu Val Ala Ala Gln Lys Ile Ile Ser Ile Thr Arg Val Ser Asp Val	145	150	155
Thr Thr Leu Glu Glu Ala Arg Pro Ala Ile Ser Pro Ser Ser Pro Asn	165	170	175
Ile Lys Arg Asn Thr Leu Ile Gly Phe Leu Ala Gly Val Ile Gly Thr	180	185	190
Ser Val Ile Val Leu His Leu Glu Leu Leu Asp Thr Arg Val Lys Arg	195	200	205
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Pro Asn Leu Gly Lys Leu Lys	225	230	

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 <213> Streptococcus pneumoniae

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<210> 8
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 <213> Streptococcus pneumoniae

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20 25 30

Met Val Gly Phe Glu Glu Gln Val Thr Gly Ser His Ala Ile Gln Val
35 40 45

Arg Ala Asp His Val Phe Asp Gly Asp Leu Ser Asp Tyr Asp Met Ile
50 55 60

Val Leu Pro Gly Gly Met Pro Gly Ser Ala His Leu Arg Asp Asn Gln
65 70 75 80

Thr Leu Ile Gln Glu Leu Gln Ser Phe Glu Gln Glu Gly Lys Lys Leu
85 90 95

Ala Ala Ile Cys Ala Ala Pro Ile Ala Leu Asn Gln Ala Glu Ile Leu
100 105 110

Lys Asn Lys Arg Tyr Thr Cys Tyr Asp Gly Val Gln Glu Gln Ile Leu
115 120 125

Asp Gly His Tyr Val Lys Glu Thr Val Val Val Asp Gly Gln Leu Thr
130 135 140

Thr Ser Arg Gly Pro Ser Thr Ala Leu Ala Phe Ala Tyr Glu Leu Val
145 150 155 160

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Arg Asp Val Phe Gly Lys Asn Gln
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<210> 9

<211> 306

<212> DNA

<213> Streptococcus pneumoniae

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<211> 101

<212> PRT

<213> Streptococcus pneumoniae

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20 25 30

Leu Glu Thr Thr Lys Lys Leu Pro Thr Thr Asn Glu Gln Leu Gln Ala
35 40 45

Val Arg Leu Ser Gly Leu Val Asn Arg Glu Leu Leu Leu Asn Pro Lys
50 55 60

His Pro Ala Pro Glu Leu Leu Asn Leu Ala Arg Phe Val Lys Arg Glu
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85 90 95

Leu Phe Lys Met Leu
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<210> 11

<211> 945

<212> DNA

<213> Streptococcus pneumoniae

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<213> Streptococcus pneumoniae

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Leu Leu Phe Val Gly Ile Gln Ser Asp Gly Ile Lys Ser Leu Leu Ser
 35 40 45

Met Ser Lys Glu Pro Val Tyr Asp Ser Arg Thr Glu Lys Leu Thr Phe
 50 55 60

Gly Lys Glu Val Glu Asn Leu Glu Ile Thr Leu His Gln His Thr Leu
 65 70 75 80

Thr Ile Thr Asp Ser Phe Asp Asp Gln Ile His Ile Ser Tyr His Pro
 85 90 95

Ser Leu Ser Ala His His Asp Leu Ile Thr Asn Gln Asn Asp Arg Thr
 100 105 110

Leu Ser Leu Thr Asp Lys Lys Leu Ser Glu Thr Pro Phe Leu Ser Ser
 115 120 125

Gly Ile Gly Gly Ile Leu His Ile Ala Ser Ser Tyr Ser Ser Arg Phe
 130 135 140

Glu Glu Val Ile Leu Arg Leu Pro Lys Gly Arg Thr Leu Lys Gly Ile
 145 150 155 160

Asn Ile Ser Ala Asn Arg Gly Gln Thr Thr Ile Ile Asn Ala Ser Leu
 165 170 175

Glu Asn Ala Thr Leu Asn Thr Asn Ser Tyr Ile Leu Arg Ile Glu Gly
 180 185 190

Ser Arg Ile Lys Asn Ser Lys Leu Thr Thr Pro Asn Ile Val Asn Ile
 195 200 205

Phe Asp Thr Val Leu Thr Asp Ser Gln Leu Glu Ser Thr Glu Asn His
 210 215 220

Phe His Ala Glu Asn Ile Gln Val His Gly Lys Val Glu Leu Thr Ala
 225 230 235 240

Lys Asp Tyr Leu Arg Ile Ile Leu Asp Gln Lys Glu Ser Gln Arg Ile
 245 250 255

Asn Trp Asp Ile Ser Ser Asn Tyr Gly Ser Ile Phe Gln Phe Thr Arg
 260 265 270

Glu Lys Pro Glu Ser Arg Gly Thr Glu Leu Ser Asn Pro Tyr Lys Thr
 275 280 285

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Ile Asp Leu Ile Ser Thr Pro Ser Arg Arg
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 <213> Streptococcus pneumoniae

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<210> 14
 <211> 292
 <212> PRT
 <213> Streptococcus pneumoniae

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 Glu Thr Ile Ala Asp Leu Asp Thr Pro Ile Glu Lys Asn Thr Gln Leu
 35 40 45
 Glu Glu Glu Val Pro Gln Ala Glu Val Glu Leu Glu Ser Gln Gln Glu
 50 55 60
 Glu Lys Ile Glu Ala Pro Glu Asp Ser Glu Ala Arg Thr Glu Ile Glu
 65 70 75 80
 Glu Lys Lys Ala Ser Asn Ser Thr Glu Glu Glu Pro Asp Leu Ser Lys
 85 90 95
 Glu Thr Glu Lys Val Thr Ile Ala Glu Glu Ser Gln Glu Ala Leu Pro
 100 105 110
 Gln Gln Lys Ala Thr Thr Lys Glu Pro Leu Leu Ile Ser Lys Ser Leu
 115 120 125
 Glu Ser Pro Tyr Ile Pro Asp Gln Ala Pro Lys Ser Arg Asp Lys Trp

130	135	140
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145	150	155 160
Ser Pro Thr Ser Lys Leu Glu Thr Ser Ile Thr His Ser Tyr Thr Ala		
	165	170 175
Phe Leu Leu Leu Ile Leu Phe Ser Ala Ser Ser Phe Phe Phe Ser Ile		
	180	185 190
Tyr His Ile Lys His Ala Tyr Tyr Gly His Ile Ala Ser Ile Asn Ser		
	195	200 205
Arg Phe Pro Glu Gln Leu Ala Pro Leu Thr Leu Phe Ser Ile Ile Ser		
	210	215 220
Ile Leu Val Ala Thr Thr Leu Phe Phe Phe Ser Phe Leu Leu Gly Ser		
	225	230 235 240
Phe Val Val Arg Arg Phe Ile His Gln Glu Lys Asp Trp Thr Leu Asp		
	245	250 255
Lys Val Leu Gln Gln Tyr Ser Gln Leu Leu Ala Ile Pro Ile Ser Ser		
	260	265 270
Leu Leu Leu Leu Val Ser Leu Leu Ser Leu Ile Ala Tyr Asp Leu Gln		
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Pro Ser Cys Val		
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<211> 990

<212> DNA

<213> Streptococcus pneumoniae

<400> 15

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gaagttattc tccgactacc aaaagggaga actctaaaag ggatcaacat ctgagccaat 540
cgcggaacaa ccaccatcat aaatgctagc cttgaaaatg cgaccctcaa tacaacagc 600
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cacgctgaaa atatccaagt ccatggcaag gttgaactga ctgccaaaga ttatctcaga 780
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<210> 16
 <211> 329
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 16

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			20					25					30		
Gly	Phe	Leu	Ile	Phe	Gly	Val	Val	Thr	Thr	Val	Ile	Gly	Phe	Ile	Leu
		35					40					45			
Leu	Phe	Val	Gly	Ile	Gln	Ser	Asp	Gly	Ile	Lys	Ser	Leu	Leu	Ser	Met
	50					55					60				
Ser	Lys	Glu	Pro	Val	Tyr	Asp	Ser	Arg	Thr	Glu	Lys	Leu	Thr	Phe	Gly
65					70					75					80
Lys	Glu	Val	Glu	Asn	Leu	Glu	Ile	Thr	Leu	His	Gln	His	Thr	Leu	Thr
				85					90					95	
Ile	Thr	Asp	Ser	Phe	Asp	Asp	Gln	Ile	His	Ile	Ser	Tyr	His	Pro	Ser
			100					105					110		
Leu	Ser	Ala	His	His	Asp	Leu	Ile	Thr	Asn	Gln	Asn	Asp	Arg	Thr	Leu
		115					120					125			
Ser	Leu	Thr	Asp	Lys	Lys	Leu	Ser	Glu	Thr	Pro	Phe	Leu	Ser	Ser	Gly
	130					135					140				
Ile	Gly	Gly	Ile	Leu	His	Ile	Ala	Ser	Ser	Tyr	Ser	Ser	Arg	Phe	Glu
145					150					155					160
Glu	Val	Ile	Leu	Arg	Leu	Pro	Lys	Gly	Arg	Thr	Leu	Lys	Gly	Ile	Asn
				165					170					175	
Ile	Ser	Ala	Asn	Arg	Gly	Gln	Thr	Thr	Ile	Ile	Asn	Ala	Ser	Leu	Glu
			180					185					190		
Asn	Ala	Thr	Leu	Asn	Thr	Asn	Ser	Tyr	Ile	Leu	Arg	Ile	Glu	Gly	Ser
		195					200					205			
Arg	Ile	Lys	Asn	Ser	Lys	Leu	Thr	Thr	Pro	Asn	Ile	Val	Asn	Ile	Phe
	210					215					220				
Asp	Thr	Val	Leu	Thr	Asp	Ser	Gln	Leu	Glu	Ser	Thr	Glu	Asn	His	Phe
225					230					235				240	
His	Ala	Glu	Asn	Ile	Gln	Val	His	Gly	Lys	Val	Glu	Leu	Thr	Ala	Lys
			245						250					255	
Asp	Tyr	Leu	Arg	Ile	Ile	Leu	Asp	Gln	Lys	Glu	Ser	Gln	Arg	Ile	Asn

260 265 270

Trp Asp Ile Ser Ser Asn Tyr Gly Ser Ile Phe Gln Phe Thr Arg Glu
275 280 285

Lys Pro Glu Ser Arg Gly Thr Glu Leu Ser Asn Pro Tyr Lys Thr Glu
290 295 300

Lys Thr Asp Val Lys Asp Gln Leu Ile Ala Arg Ser Asp Asp Asn Ile
305 310 315 320

Asp Leu Ile Ser Thr Pro Ser Arg Arg
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<210> 17
<211> 79
<212> DNA
<213> Streptococcus pneumoniae

<400> 17
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ggacgctgct attttaatc 79

<210> 18
<211> 26
<212> PRT
<213> Streptococcus pneumoniae

<400> 18
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Arg Val Gly Glu Gly Arg Cys Tyr Phe Asn
20 25

<210> 19
<211> 715
<212> DNA
<213> Streptococcus pneumoniae

<400> 19
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acccagcagt ggtcgtattt tggtagacgg tcaggagtta tcggaaaatc gcttggctat 180
taaacgaaag attggctacg tagcagactc gcctgactta tttttacgct taacggccaa 240
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tctttctcac ggaatgcgct agaaagtctt tgtcatcgga gcactcttgt ctgatcccgga 420
tatttggtt ttggacgaac ccttgactgg tttggatccc caggctgcct ttgatttgaa 480
acagatgatg aaggaacatg cacaaaaagg gaagacagtc ttgttttcaa ctcatgtcct 540
agaggtggca gagcaagtct gtgatcggat tgccattttg aaaaaggggc atttgattta 600
ttgtggttaag gtagaggact tgaggaaaga ccaccagac cagtcttttg aaagtatcta 660

ccttagtctt gctggtagaa aagaggaggt tgcggatgcg tctcaaggtc attaa

715

<210> 20

<211> 237

<212> PRT

<213> Streptococcus pneumoniae

<400> 20

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Ile Met Gly Leu Ile Gly His Asn Gly Ala Gly Lys Ser Thr Thr Ile
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Lys Ser Leu Val Ser Ile Ile Ser Pro Ser Ser Gly Arg Ile Leu Val
35 40 45

Asp Gly Gln Glu Leu Ser Glu Asn Arg Leu Ala Ile Lys Arg Lys Ile
50 55 60

Gly Tyr Val Ala Asp Ser Pro Asp Leu Phe Leu Arg Leu Thr Ala Asn
65 70 75 80

Glu Phe Trp Glu Leu Ile Ala Ser Ser Tyr Asp Leu Ser Arg Ser Asp
85 90 95

Leu Glu Ala Ser Leu Ala Arg Leu Leu Asn Val Phe Asp Phe Ala Glu
100 105 110

Asn Arg Tyr Gln Val Ile Glu Thr Leu Ser His Gly Met Arg Gln Lys
115 120 125

Val Phe Val Ile Gly Ala Leu Leu Ser Asp Pro Asp Ile Trp Val Leu
130 135 140

Asp Glu Pro Leu Thr Gly Leu Asp Pro Gln Ala Ala Phe Asp Leu Lys
145 150 155 160

Gln Met Met Lys Glu His Ala Gln Lys Gly Lys Thr Val Leu Phe Ser
165 170 175

Thr His Val Leu Glu Val Ala Glu Gln Val Cys Asp Arg Ile Ala Ile
180 185 190

Leu Lys Lys Gly His Leu Ile Tyr Cys Gly Lys Val Glu Asp Leu Arg
195 200 205

Lys Asp His Pro Asp Gln Ser Leu Glu Ser Ile Tyr Leu Ser Leu Ala
210 215 220

Gly Arg Lys Glu Glu Val Ala Asp Ala Ser Gln Gly His
225 230 235

<210> 21

<211> 360
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 21
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 tcactctttg aaatggtttc aatgctggca ttgatttggc taatacgatt gtcattttta 300
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<210> 22
 <211> 119
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 22
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 Val Ile Pro Ala Pro Arg Lys Ser Cys Cys Gln Phe Ser Glu Arg Ile
 35 40 45
 Leu Ala Thr Trp Leu Lys Lys Leu Leu Leu Val Ser Ser Val Val Val
 50 55 60
 Ala Ser Ala Gly Cys Ser Leu Ile Ile Arg Ser Ile Lys Ala Thr Trp
 65 70 75 80
 Ser Ser Phe Glu Met Val Ser Met Leu Ala Leu Ile Trp Leu Ile Arg
 85 90 95
 Leu Ser Phe Leu Arg Ser Pro Ile Ala Ile Ala Val Ser Ser Ser Pro
 100 105 110
 Val Leu Lys Pro Gly Ser Thr
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<210> 23
 <211> 1455
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 23
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 cagaaagaag gaattcaggc tgagcaaatt gtaatcaaaa ttacagatca gggctatgta 240
 acgtcacacg gtgaccacta tcattactat aatgggaaag ttccttatga tgccctcttt 300
 agtgaagaac tcttgatgaa ggatccaaac tatcaactta aagacgctga tattgtcaat 360

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<210> 24

<211> 484

<212> PRT

<213> Streptococcus pneumoniae

<400> 24

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```

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Ser Leu Ser Leu Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu
      20             25             30

```

```

Asn Lys Asp Asn Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser
      35             40             45

```

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Gln Lys Ser Glu Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly
      50             55             60

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Ile Gln Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val
      65             70             75             80

```

```

Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr
      85             90             95

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Asp Ala Leu Phe Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln
      100            105            110

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Leu Lys Asp Ala Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile
      115            120            125

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Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala
      130            135            140

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Asp Asn Val Arg Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His
      145            150            155            160

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Val Lys Asp Asn Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser
165 170 175
Gln Gly Arg Tyr Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp
180 185 190
Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His
195 200 205
Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala
210 215 220
Ala Lys Ala His Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser
225 230 235 240
Tyr Ser Ser Thr Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly
245 250 255
Ser Thr Ser Lys Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu
260 265 270
Lys Glu Leu Tyr Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp
275 280 285
Gly Leu Val Phe Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly
290 295 300
Val Ala Ile Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys
305 310 315 320
Leu Ser Ala Leu Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly
325 330 335
Thr Gly Ser Thr Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser
340 345 350
Ser Leu Gly Ser Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys
355 360 365
Glu Leu Ser Ser Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile
370 375 380
Val Glu Glu Thr Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe
385 390 395 400
His Tyr Ile Pro Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn
405 410 415
Asn Ser Leu Ala Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr
420 425 430
Ser His Glu Lys His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg
435 440 445
Ile Ile Ala Glu Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His
450 455 460

Asn His Tyr Phe Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Val
 465 470 475 480

Arg Lys Asn Ile

<210> 25

<211> 840

<212> DNA

<213> Streptococcus pneumoniae

<400> 25

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<210> 26

<211> 279

<212> PRT

<213> Streptococcus pneumoniae

<400> 26

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Gly Ser Tyr Thr Ala Leu Ile Gly His Thr Gly Ser Gly Lys Ser Thr
  35 40 45
Ile Leu Gln Leu Leu Asn Gly Leu Leu Val Pro Ser Gln Gly Ser Val
  50 55 60
Arg Val Phe Asp Thr Leu Ile Thr Ser Thr Ser Lys Asn Lys Asp Ile
  65 70 75 80
Arg Gln Ile Arg Lys Gln Val Gly Leu Val Phe Gln Phe Ala Glu Asn
  85 90 95
Gln Ile Phe Glu Glu Thr Val Leu Lys Asp Val Ala Phe Gly Pro Gln
  100 105 110

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Asn Phe Gly Val Ser Glu Glu Asp Ala Val Lys Thr Ala Arg Glu Lys
 115 120 125
 Leu Ala Leu Val Gly Ile Asp Glu Ser Leu Phe Asp Arg Ser Pro Phe
 130 135 140
 Glu Leu Ser Gly Gly Gln Met Arg Arg Val Ala Ile Ala Gly Ile Leu
 145 150 155 160
 Ala Met Glu Pro Ala Ile Leu Val Leu Asp Glu Pro Thr Ala Gly Leu
 165 170 175
 Asp Pro Leu Gly Arg Lys Glu Leu Met Thr Leu Phe Lys Lys Leu His
 180 185 190
 Gln Ser Gly Met Thr Ile Val Leu Val Thr His Leu Met Asp Asp Val
 195 200 205
 Ala Glu Tyr Ala Asn Gln Val Tyr Val Met Glu Lys Gly Arg Leu Val
 210 215 220
 Lys Gly Gly Lys Pro Ser Asp Val Phe Gln Asp Val Val Phe Met Glu
 225 230 235 240
 Glu Val Gln Leu Gly Val Pro Lys Ile Thr Ala Phe Cys Lys Arg Leu
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 Ala Asp Arg Gly Val Ser Phe Lys Arg Leu Pro Ile Lys Ile Glu Glu
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 Phe Lys Glu Ser Leu Asn Gly
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<210> 27

<211> 6360

<212> DNA

<213> Streptococcus pneumoniae

<400> 27

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<212> PRT

<213> Streptococcus pneumoniae

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Thr	Lys	Val	Leu	Tyr	Thr	Tyr	Asp	Arg	Ile	Phe	Asn	Gly	Ser	Ala	Ile
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Arg	Lys	Glu	Ile	Gly	Val	Glu	Glu	Ala	Ile	Asp	Tyr	Leu	Lys	Ser	Ile
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Asp	Asp	Ala	Lys	Ala	Ser	Met	Arg	Phe	Lys	Lys	Glu	Asp	Leu	Lys	Gly
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Thr	Asp	Lys	Asn	Tyr	Trp	Leu	Ser	Asp	Lys	Ile	Pro	His	Ala	Phe	Asn
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Ala	Pro	Asn	Ala	Gln	Ile	Phe	Ser	Tyr	Lys	Met	Tyr	Ser	Asp	Ala	Gly
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Ala	Ser	Ser	Ser	Ser	Trp	Asp	Leu	Val	Ala	Asn	Asn	His	Leu	Lys	Met

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Ala Val Ala Ser Ala Lys Asn Gln Thr Val Glu Phe Asp Lys Val Asn						
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Ile Gly Gly Glu Ser Phe Lys Tyr Arg Asn Ile Gly Ala Phe Phe Asp						
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Lys Ser Lys Ile Thr Thr Asn Glu Asp Gly Thr Lys Ala Pro Ser Lys						
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Leu Lys Phe Val Tyr Ile Gly Lys Gly Gln Asp Gln Asp Leu Ile Gly						
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Leu Asp Leu Arg Gly Lys Ile Ala Val Met Asp Arg Ile Tyr Thr Lys						
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Asp Leu Lys Asn Ala Phe Lys Lys Ala Met Asp Lys Gly Ala Arg Ala						
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Ile Met Val Val Asn Thr Val Asn Tyr Tyr Asn Arg Asp Asn Trp Thr						
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Glu Leu Pro Ala Met Gly Tyr Glu Ala Asp Glu Gly Thr Lys Ser Gln						
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Val Phe Ser Ile Ser Gly Asp Asp Gly Val Lys Leu Trp Asn Met Ile						
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Ala Pro Asp Thr Asp Lys Glu Leu Tyr Lys Glu Asp Ile Ile Val Pro						
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Ala Gly Ser Thr Ser Trp Gly Pro Arg Ile Asp Leu Leu Leu Lys Pro						
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Asp Val Ser Ala Pro Gly Lys Asn Ile Lys Ser Thr Leu Asn Val Ile						
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Asn Gly Lys Ser Thr Tyr Gly Tyr Met Ser Gly Thr Ser Met Ala Thr						
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Pro Ile Val Ala Ala Ser Thr Val Leu Ile Arg Pro Lys Leu Lys Glu						
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Met Leu Glu Arg Pro Val Leu Lys Asn Leu Lys Gly Asp Asp Lys Ile						

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Met	Met	Asp	Ala	Thr	Ser	Trp	Lys	Glu	Lys	Ser	Gln	Tyr	Phe	Ala	Ser
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Pro	Arg	Gln	Gln	Gly	Ala	Gly	Leu	Ile	Asn	Val	Ala	Asn	Ala	Leu	Arg
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785					790					795					800
Lys	Val	Ser	Ala	Ser	Ala	Ile	Thr	Thr	Asp	Ser	Leu	Thr	Asp	Arg	Leu
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Ile	Val	Pro	Glu	Ile	His	Pro	Glu	Lys	Val	Lys	Gly	Ala	Asn	Ile	Thr
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Glu	Ser	Phe	Ile	His	Phe	Glu	Ser	Val	Glu	Ala	Met	Glu	Ala	Leu	Asn
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Met	Gly	Phe	Ala	Gly	Asn	Trp	Asn	His	Glu	Pro	Ile	Leu	Asp	Lys	Trp
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Ala	Trp	Glu	Glu	Gly	Ser	Arg	Ser	Lys	Thr	Leu	Gly	Gly	Tyr	Asp	Asp
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945					950					955					960
Glu	His	Gly	Ile	Asp	Lys	Phe	Asn	Pro	Ala	Gly	Val	Ile	Gln	Asn	Arg
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Lys	Asp	Lys	Asn	Thr	Thr	Ser	Leu	Asp	Gln	Asn	Pro	Glu	Leu	Phe	Ala
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Phe	Asn	Asn	Glu	Gly	Ile	Asn	Ala	Pro	Ser	Ser	Ser	Gly	Ser	Lys	Ile

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Arg Asp Leu Lys Val Ile Ser Arg Glu His Phe Ile Arg Gly Ile Leu 1060 1065 1070		
Asn Ser Lys Ser Asn Asp Ala Lys Gly Ile Lys Ser Ser Lys Leu Lys 1075 1080 1085		
Val Trp Gly Asp Leu Lys Trp Asp Gly Leu Ile Tyr Asn Pro Arg Gly 1090 1095 1100		
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Lys Ile Arg Gly Gln Phe Glu Pro Ile Ala Glu Gly Gln Tyr Phe Tyr 1125 1130 1135		
Lys Phe Lys Tyr Arg Leu Thr Lys Asp Tyr Pro Trp Gln Val Ser Tyr 1140 1145 1150		
Ile Pro Val Lys Ile Asp Asn Thr Ala Pro Lys Ile Val Ser Val Asp 1155 1160 1165		
Phe Ser Asn Pro Glu Lys Ile Lys Leu Ile Thr Lys Asp Thr Tyr His 1170 1175 1180		
Lys Val Lys Asp Gln Tyr Lys Asn Glu Thr Leu Phe Ala Arg Asp Gln 1185 1190 1195 1200		
Lys Glu His Pro Glu Lys Phe Asp Glu Ile Ala Asn Glu Val Trp Tyr 1205 1210 1215		
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Glu Val Thr Tyr Ala Gly Glu Gly Gln Gly Arg Asn Arg Lys Leu Asp 1235 1240 1245		
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Lys Ile His Arg Ile Lys Phe Ala Asn Gln Ala Asp Glu Lys Gly Met 1285 1290 1295		
Ile Ser Tyr Tyr Leu Val Asp Pro Asp Gln Asp Ser Ser Lys Tyr Gln		

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Lys Glu Gly Ser Leu Lys Lys Asp Thr Thr Gly Val Glu His His His 1330	1335	1340
Gln Glu Asn Glu Glu Ser Ile Lys Glu Lys Ser Ser Phe Thr Ile Asp 1345	1350	1355 1360
Arg Asn Ile Ser Thr Ile Arg Asp Phe Glu Asn Lys Asp Leu Lys Lys 1365	1370	1375
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Thr Lys Tyr Asp Phe His Ser Lys Thr Met Thr Phe Asp Leu Tyr Ala 1475	1480	1485
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Ser Tyr Gly Asn Val Ile Glu Leu Gly Glu Gly Asp Leu Ser Lys Asn 1540	1545	1550
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Asp Ser Arg Asn Val Glu Asp Gly Arg Ser Thr Gln Ser Val Leu Met 1635	1640	1645
Ser Ala Leu Asp Gly Phe Asn Ile Ile Arg Tyr Gln Val Phe Thr Phe 1650	1655	1660
Lys Met Asn Asp Lys Gly Glu Ala Ile Asp Lys Asp Gly Asn Leu Val 1665	1670	1675
Thr Asp Ser Ser Lys Leu Val Leu Phe Gly Lys Asp Asp Lys Glu Tyr 1685	1690	1695
Thr Gly Glu Asp Lys Phe Asn Val Glu Ala Ile Lys Glu Asp Gly Ser 1700	1705	1710
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Phe Tyr Leu Arg Gly Lys Ile Ser Asp Lys Gly Gly Phe Asn Trp Glu 1745	1750	1755
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Leu His Ile Asp Asn Thr Arg Asp Phe Asn Ile Lys Leu Asn Val Lys 1780	1785	1790
Asp Gly Asp Ile Met Asp Trp Gly Met Lys Asp Tyr Lys Ala Asn Gly 1795	1800	1805
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Gly Tyr Ser Asp Leu Asn Ala Lys Ala Val Gly Val His Tyr Gln Phe 1825	1830	1835
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Thr Ser Ile Glu Tyr Ala Asp Gly Lys Ser Val Val Phe Asn Ile Asn 1860	1865	1870
Asp Lys Arg Asn Asn Gly Phe Asp Gly Glu Ile Gln Glu Gln His Ile 1875	1880	1885
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 145 150 155 160
 Val Leu Glu Ile Glu Asp Arg Phe Arg Pro Glu Leu Leu Ile Thr Val
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gacatcgcat gtaaaaattct cttgaacgat catgagggtg aaaatcttaa gattgctcat 960
gtggatgaaa agatgggtgc tctttctatg aatgccggcg tcttccactt cgatgaaaca 1020
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atcaagtcaa tccttgaaaa cttgccagtt gtttctgtta gcctgtctga acacggtcac 1140
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aaacaaactg gctttaaagg tcatgaacaa gtcacgggtg gtggaacctt tggtcgcttg 1260
ctagaacgag gagttgccta cgggtgctatg ttcccagact cgattgatac catgcaccaa 1320
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<210> 32

<211> 466

<212> PRT

<213> Streptococcus pneumoniae

<400> 32

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Met Thr Ala Ile Asp Phe Thr Ala Glu Val Glu Lys Arg Lys Glu Asp
  1             5             10             15

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Leu Leu Ala Asp Leu Phe Ser Leu Leu Glu Ile Asn Ser Glu Arg Asp
      20             25             30

```

```

Asp Ser Lys Ala Asp Ala Gln His Pro Phe Gly Pro Gly Pro Val Lys
      35             40             45

```

```

Ala Leu Glu Lys Phe Leu Glu Ile Ala Asp Arg Asp Gly Tyr Pro Thr
      50             55             60

```

```

Lys Asn Val Asp Asn Tyr Ala Gly His Phe Glu Phe Gly Asp Gly Glu
      65             70             75             80

```

```

Glu Val Leu Gly Ile Phe Ala His Met Asp Val Val Pro Ala Gly Ser
      85             90             95

```

```

Gly Trp Asp Thr Asp Pro Tyr Thr Pro Thr Ile Lys Asp Gly Arg Leu
     100             105             110

```

```

Tyr Ala Arg Gly Ala Ser Asp Asp Lys Gly Pro Thr Thr Ala Cys Tyr
     115             120             125

```

```

Tyr Gly Leu Lys Ile Ile Lys Glu Leu Gly Leu Pro Thr Ser Lys Lys

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130	135	140
Val Arg Phe Ile Val Gly Thr Asp Glu Glu Ser Gly Trp Ala Asp Met 145 150 155 160		
Asp Tyr Tyr Phe Glu His Val Gly Leu Ala Lys Pro Asp Phe Gly Phe 165 170 175		
Ser Pro Asp Ala Glu Phe Pro Ile Ile Asn Gly Glu Lys Gly Asn Ile 180 185 190		
Thr Glu Tyr Leu His Phe Ala Gly Glu Asn Thr Gly Val Ala Arg Leu 195 200 205		
His Ser Phe Thr Gly Gly Leu Arg Glu Asn Met Val Pro Glu Ser Ala 210 215 220		
Thr Ala Val Val Ser Gly Asp Leu Ala Asp Leu Gln Ala Lys Leu Asp 225 230 235 240		
Ala Phe Val Ala Glu His Lys Leu Arg Gly Glu Leu Gln Glu Glu Ala 245 250 255		
Gly Lys Tyr Lys Val Thr Ile Ile Gly Lys Ser Ala His Gly Ala Met 260 265 270		
Pro Ala Ser Gly Val Asn Gly Ala Thr Tyr Leu Ala Leu Phe Leu Ser 275 280 285		
Gln Phe Gly Phe Ala Gly Pro Ala Lys Asp Tyr Leu Asp Ile Ala Gly 290 295 300		
Lys Ile Leu Leu Asn Asp His Glu Gly Glu Asn Leu Lys Ile Ala His 305 310 315 320		
Val Asp Glu Lys Met Gly Ala Leu Ser Met Asn Ala Gly Val Phe His 325 330 335		
Phe Asp Glu Thr Ser Ala Asp Asn Thr Ile Ala Leu Asn Ile Arg Tyr 340 345 350		
Pro Lys Gly Thr Ser Pro Glu Gln Ile Lys Ser Ile Leu Glu Asn Leu 355 360 365		
Pro Val Val Ser Val Ser Leu Ser Glu His Gly His Thr Pro His Tyr 370 375 380		
Val Pro Met Glu Asp Pro Leu Val Gln Thr Leu Leu Asn Ile Tyr Glu 385 390 395 400		
Lys Gln Thr Gly Phe Lys Gly His Glu Gln Val Ile Gly Gly Gly Thr 405 410 415		
Phe Gly Arg Leu Leu Glu Arg Gly Val Ala Tyr Gly Ala Met Phe Pro 420 425 430		
Asp Ser Ile Asp Thr Met His Gln Ala Asn Glu Phe Ile Ala Leu Asp		

435

440

445

Asp Leu Phe Arg Ala Ala Ala Ile Tyr Ala Glu Ala Ile Tyr Glu Leu
 450 455 460

Ile Lys
 465

<210> 33

<211> 1617

<212> DNA

<213> Streptococcus pneumoniae

<400> 33

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 attgcatga atttagagcg gtttttgaaa ttgtcaatct accaaatgat tgtctggtgt 180
 gggataatat tccttgactg ggtagtgaaa aattatcagg ttgaagtgat ccaagagttt 240
 aatctagaga ttcgaaatag agttgccaca gacatctcta actctaccta tcaagaattt 300
 catagtaaat catcaggaac atatctttcg tggctaaata atgatgttca gactttaaat 360
 gatcaggcgt ttaaacaact ttttttagta ataaaaggaa tttctggtac tatatttgca 420
 gttgtgactc ttaatcacta tcattggtca ttgactgtag ccaccttggt ttcattaatg 480
 attatgctac ttgtaccaa aatctttgca tcgaaaatgc gagaagttag tctaaattta 540
 actaaccaaa atgaagcttt tttaaaatct agtgagacta tattgaatgg atttgatgtg 600
 ttagcgctct tgaatctttt atatgtattg cctaagaaaa ttaaagaagc aggaatttta 660
 ttaaagatgg ttatacaaag aaagacaact gtagaaacgt tagcaggcgc tattagcttc 720
 tttctcaata ttttttttca gatatctctc gtttttttaa caggctatct tgcaataaaa 780
 ggaatagtga aaattggtac tattgaagca ataggagcac taacaggtgt tattttttaca 840
 gcgctagggtg aattaggagg tcaattatcc tctattattg gtacgaagcc tattttttta 900
 aaattgtatt caattaatcc aattgagtca aataaaatga atgatatcga accaaatgag 960
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 gaaatattaa aaaacttaaa tttttgtttt caacgtaatg aaaagtattt aatttttaggt 1080
 gaaagtggaa gcgggaaatc tacattatta aaattattga atggcttttt gagagattat 1140
 agtggagaat tgcgattctg cggggatgat ataaaaaaaa cctcctattt aaatatggtt 1200
 tcgaatgttc tatatgtaga tcaaaaagct tatttgtttg aaggtagcat tagagataat 1260
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 aaaatagtat taattgacga gggaacttct gctatcgata ggagaacttc gttagcgatt 1500
 gaacgtaaga tattagatag agaggatttg actgtcatta ttgttaccga tgctccgcatt 1560
 ccggaactta aacaatattt tactaagata tatcaatttc caaaggattt tatttaa 1617

<210> 34

<211> 538

<212> PRT

<213> Streptococcus pneumoniae

<400> 34

Met Tyr Thr Ile Ile Lys Ser Asn Ile Lys Lys Phe Ser Leu Leu Thr
 1 5 10 15

Ile Phe Ile Val Ala Gly Gln Leu Leu Leu Ile Tyr Ala Ala Thr Ile
 20 25 30

Asn Ala Leu Val Leu Asn Glu Leu Ile Ala Met Asn Leu Glu Arg Phe
 35 40 45
 Leu Lys Leu Ser Ile Tyr Gln Met Ile Val Trp Cys Gly Ile Ile Phe
 50 55 60
 Leu Asp Trp Val Val Lys Asn Tyr Gln Val Glu Val Ile Gln Glu Phe
 65 70 75 80
 Asn Leu Glu Ile Arg Asn Arg Val Ala Thr Asp Ile Ser Asn Ser Thr
 85 90 95
 Tyr Gln Glu Phe His Ser Lys Ser Ser Gly Thr Tyr Leu Ser Trp Leu
 100 105 110
 Asn Asn Asp Val Gln Thr Leu Asn Asp Gln Ala Phe Lys Gln Leu Phe
 115 120 125
 Leu Val Ile Lys Gly Ile Ser Gly Thr Ile Phe Ala Val Val Thr Leu
 130 135 140
 Asn His Tyr His Trp Ser Leu Thr Val Ala Thr Leu Phe Ser Leu Met
 145 150 155 160
 Ile Met Leu Leu Val Pro Lys Ile Phe Ala Ser Lys Met Arg Glu Val
 165 170 175
 Ser Leu Asn Leu Thr Asn Gln Asn Glu Ala Phe Leu Lys Ser Ser Glu
 180 185 190
 Thr Ile Leu Asn Gly Phe Asp Val Leu Ala Ser Leu Asn Leu Leu Tyr
 195 200 205
 Val Leu Pro Lys Lys Ile Lys Glu Ala Gly Ile Leu Leu Lys Met Val
 210 215 220
 Ile Gln Arg Lys Thr Thr Val Glu Thr Leu Ala Gly Ala Ile Ser Phe
 225 230 235 240
 Phe Leu Asn Ile Phe Phe Gln Ile Ser Leu Val Phe Leu Thr Gly Tyr
 245 250 255
 Leu Ala Ile Lys Gly Ile Val Lys Ile Gly Thr Ile Glu Ala Ile Gly
 260 265 270
 Ala Leu Thr Gly Val Ile Phe Thr Ala Leu Gly Glu Leu Gly Gly Gln
 275 280 285
 Leu Ser Ser Ile Ile Gly Thr Lys Pro Ile Phe Leu Lys Leu Tyr Ser
 290 295 300
 Ile Asn Pro Ile Glu Ser Asn Lys Met Asn Asp Ile Glu Pro Asn Glu
 305 310 315 320
 Val Asn Arg Asp Phe Pro Leu Tyr Glu Ala Lys Asn Ile Cys Tyr Lys
 325 330 335

Tyr Gly Asp Lys Glu Ile Leu Lys Asn Leu Asn Phe Cys Phe Gln Arg
 340 345 350
 Asn Glu Lys Tyr Leu Ile Leu Gly Glu Ser Gly Ser Gly Lys Ser Thr
 355 360 365
 Leu Leu Lys Leu Leu Asn Gly Phe Leu Arg Asp Tyr Ser Gly Glu Leu
 370 375 380
 Arg Phe Cys Gly Asp Asp Ile Lys Lys Thr Ser Tyr Leu Asn Met Val
 385 390 395 400
 Ser Asn Val Leu Tyr Val Asp Gln Lys Ala Tyr Leu Phe Glu Gly Thr
 405 410 415
 Ile Arg Asp Asn Ile Leu Leu Glu Glu Asn Tyr Thr Asp Glu Glu Ile
 420 425 430
 Leu Gln Ser Leu Glu Gln Val Gly Leu Ser Val Lys Asp Phe Pro Asn
 435 440 445
 Asn Ile Leu Asp Tyr Tyr Val Gly Asp Asp Gly Arg Leu Leu Ser Gly
 450 455 460
 Gly Gln Lys Gln Lys Ile Thr Leu Ala Arg Gly Leu Ile Arg Asn Lys
 465 470 475 480
 Lys Ile Val Leu Ile Asp Glu Gly Thr Ser Ala Ile Asp Arg Arg Thr
 485 490 495
 Ser Leu Ala Ile Glu Arg Lys Ile Leu Asp Arg Glu Asp Leu Thr Val
 500 505 510
 Ile Ile Val Thr His Ala Pro His Pro Glu Leu Lys Gln Tyr Phe Thr
 515 520 525
 Lys Ile Tyr Gln Phe Pro Lys Asp Phe Ile
 530 535

<210> 35

<211> 705

<212> DNA

<213> Streptococcus pneumoniae

<400> 35

ataacagtta aacagattat ggacgaaata gccgtttcag atatgactgc aaggcgctat 60
 ttacaggaat tagctgataa agatttgctg attcgtgtgc atggtggagc tgaaaaactt 120
 cgaaccaact cccttttgac taatgagcga tcaaatattg aaaaacaagc cctccaaacg 180
 gcagaaaaac aagaaatagc ccattttgca ggcagtctag tagaagaaag agaaactatt 240
 ttcattggac caggaacaac attagagttt tttgcgcgtg agttgcctat tgacaatatc 300
 cgcgtcgtaa ccaacagtct acctgtttt ctgattttta gccaacgaaa attaacagat 360
 ttgattttta taggtggaaa ttatcgcat attacaggtg cttttgttg tacattgacc 420
 ctacaaaatc tctctaactc ccaattttct aaagctttcg ttagctgtaa tggatttcaa 480
 aacggagctc tagctacttt tagcgaggaa gagggagagg ctcaacgcat cgcttttaat 540
 aattctaata aaaaatattt actcgcat catagcaagt tcaataagtt tgatttttat 600

actttttata atgtatcaaa tcttgataact attgtttcag attctaaaact aagtgattca 660
 atccttttta agctatctaa acacattaataa gtcacaaagc cttaa 705

<210> 36

<211> 234

<212> PRT

<213> Streptococcus pneumoniae

<400> 36

Ile Thr Val Lys Gln Ile Met Asp Glu Ile Ala Val Ser Asp Met Thr
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Ala Arg Arg Tyr Leu Gln Glu Leu Ala Asp Lys Asp Leu Leu Ile Arg
 20 25 30

Val His Gly Gly Ala Glu Lys Leu Arg Thr Asn Ser Leu Leu Thr Asn
 35 40 45

Glu Arg Ser Asn Ile Glu Lys Gln Ala Leu Gln Thr Ala Glu Lys Gln
 50 55 60

Glu Ile Ala His Phe Ala Gly Ser Leu Val Glu Glu Arg Glu Thr Ile
 65 70 75 80

Phe Ile Gly Pro Gly Thr Thr Leu Glu Phe Phe Ala Arg Glu Leu Pro
 85 90 95

Ile Asp Asn Ile Arg Val Val Thr Asn Ser Leu Pro Val Phe Leu Ile
 100 105 110

Leu Ser Glu Arg Lys Leu Thr Asp Leu Ile Leu Ile Gly Gly Asn Tyr
 115 120 125

Arg Asp Ile Thr Gly Ala Phe Val Gly Thr Leu Thr Leu Gln Asn Leu
 130 135 140

Ser Asn Leu Gln Phe Ser Lys Ala Phe Val Ser Cys Asn Gly Ile Gln
 145 150 155 160

Asn Gly Ala Leu Ala Thr Phe Ser Glu Glu Glu Gly Glu Ala Gln Arg
 165 170 175

Ile Ala Leu Asn Asn Ser Asn Lys Lys Tyr Leu Leu Ala Asp His Ser
 180 185 190

Lys Phe Asn Lys Phe Asp Phe Tyr Thr Phe Tyr Asn Val Ser Asn Leu
 195 200 205

Asp Thr Ile Val Ser Asp Ser Lys Leu Ser Asp Ser Ile Leu Phe Lys
 210 215 220

Leu Ser Lys His Ile Lys Val Ile Lys Pro
 225 230

<210> 37
 <211> 483
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 37
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 tactatcact tgaaacagct agacaaaaa gataaagacc aagagcttaa aactgaaatt 120
 caatccatct ttatcgaaca caagggaat tatgcttata gccgggttca tttagaacta 180
 agaaatcgtg gttatctggt aaatcataaa agagttcaag gcttgatgaa agtactcaat 240
 ttacaagcta aaatgcgaaa gaaacgaaaa tattcttctc ataaaggaga cgttggtaag 300
 aaggcagaga atctcattca agcccaattt gaaggctcta aaacaatgga aaagtgtac 360
 acagatgtga ctgaatttgc cattccagca agtactcaaa agctttactt atcaccagtt 420
 ttatagtggt ttaacagcga aattattgct ttaaatcttt ctgttcgcc taatttagaa 480
 taa 483

<210> 38
 <211> 160
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 38
 Met Thr Glu Phe Ser Leu Asp Leu Leu Leu Glu Ala Ile Lys Leu Ala
 1 5 10 15
 Arg Trp Thr Tyr Tyr Tyr His Leu Lys Gln Leu Asp Lys Thr Asp Lys
 20 25 30
 Asp Gln Glu Leu Lys Thr Glu Ile Gln Ser Ile Phe Ile Glu His Lys
 35 40 45
 Gly Asn Tyr Ala Tyr Arg Arg Val His Leu Glu Leu Arg Asn Arg Gly
 50 55 60
 Tyr Leu Val Asn His Lys Arg Val Gln Gly Leu Met Lys Val Leu Asn
 65 70 75 80
 Leu Gln Ala Lys Met Arg Lys Lys Arg Lys Tyr Ser Ser His Lys Gly
 85 90 95
 Asp Val Gly Lys Lys Ala Glu Asn Leu Ile Gln Ala Gln Phe Glu Gly
 100 105 110
 Ser Lys Thr Met Glu Lys Cys Tyr Thr Asp Val Thr Glu Phe Ala Ile
 115 120 125
 Pro Ala Ser Thr Gln Lys Leu Tyr Leu Ser Pro Val Leu Asp Gly Phe
 130 135 140
 Asn Ser Glu Ile Ile Ala Phe Asn Leu Ser Cys Ser Pro Asn Leu Glu
 145 150 155 160

<210> 39
 <211> 1266
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 39
 ccaggatttg gtaccgttgc aagtgggtgtg cctttcctcc taaaggaaaa tggaggaaaa 60
 atcaatcaat cagcacattc agatatcaaa gttgctaagg tattggtcaa ggatgaagat 120
 gaaaaaaatc gcttgcttgc agcagggaat gactttaact ttgtaaccaa tgtggatgat 180
 attttatcag accaggatat tactatcgta gtggaattga tggggcgtat tgagcctgct 240
 aaaaccttta tcaactcgtgc cttggaagct ggaaaacacg ttgttactgc taacaaggac 300
 ctttttagctg tccatggcgc agaattgcta gaaatcgctc aagctaacaa ggtagcactt 360
 tactacgaag cagcagttgc tgggtgggatt ccaattcttc gtacttttagc aaattccttg 420
 gcttctgata aaattacgcg cgtgcttggg gtagtcaacg gaacttccaa cttcatgggtg 480
 accaagatgg tggagaaggg ctggtcttac gatgatgctc ttgcggaagc acaacgtcta 540
 ggatttgcag aaagcgatcc gacgaatgac gtagatggga ttgatgcagc ctacaagatg 600
 gttattttga gccaatattgc ctttggcatg aagattgcct ttgatgatgt agcccacaag 660
 ggaatccgca atatcacacc agaagacgta gctgtagctc aagagcttgg ttacgtagtg 720
 aaattgggtt gttctattga ggaaacttct tcaggtattg ctgcagaagt gactccaacc 780
 ttcttaccta aagcgcaccc acttgctagt gtgaatggcg taatgaacgc tgtctttgta 840
 gaactctatc gtattgggtg gtctatgtac tacggaccag gtgcgggtca aaaaccaact 900
 gcaacaagtg ttgtagctga tattgtccgt atcgttcgtc gtttgaatga tgggtactatt 960
 ggcaaagact tcaacgaata tagccgtgac ttggtccttg caaatcctga agatgtcaaa 1020
 gcaaactact atttctcaat cttggctcta gactcaaaag gtcaggtctt gaagttggct 1080
 gaaatcttca atgctcaaga tatttccttt aagcaaattc ttcaagatgg caaagagggt 1140
 gacaaggcgc gtgtcggtat catcacacac aagattaata aagcccagct tgaaaatgtc 1200
 tcagctgaat tgaagaaggt ttcagaattc gacctcttga ataccttcaa ggtgctagga 1260
 gaataa 1266

<210> 40
 <211> 421
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 40
 Pro Gly Phe Gly Thr Val Ala Ser Gly Val Pro Phe Leu Leu Lys Glu
 1 5 10 15
 Asn Gly Gly Lys Ile Asn Gln Ser Ala His Ser Asp Ile Lys Val Ala
 20 25 30
 Lys Val Leu Val Lys Asp Glu Asp Glu Lys Asn Arg Leu Leu Ala Ala
 35 40 45
 Gly Asn Asp Phe Asn Phe Val Thr Asn Val Asp Asp Ile Leu Ser Asp
 50 55 60
 Gln Asp Ile Thr Ile Val Val Glu Leu Met Gly Arg Ile Glu Pro Ala
 65 70 75 80
 Lys Thr Phe Ile Thr Arg Ala Leu Glu Ala Gly Lys His Val Val Thr
 85 90 95
 Ala Asn Lys Asp Leu Leu Ala Val His Gly Ala Glu Leu Leu Glu Ile
 100 105 110

Ala Gln Ala Asn Lys Val Ala Leu Tyr Tyr Glu Ala Ala Val Ala Gly
 115 120 125
 Gly Ile Pro Ile Leu Arg Thr Leu Ala Asn Ser Leu Ala Ser Asp Lys
 130 135 140
 Ile Thr Arg Val Leu Gly Val Val Asn Gly Thr Ser Asn Phe Met Val
 145 150 155 160
 Thr Lys Met Val Glu Glu Gly Trp Ser Tyr Asp Asp Ala Leu Ala Glu
 165 170 175
 Ala Gln Arg Leu Gly Phe Ala Glu Ser Asp Pro Thr Asn Asp Val Asp
 180 185 190
 Gly Ile Asp Ala Ala Tyr Lys Met Val Ile Leu Ser Gln Phe Ala Phe
 195 200 205
 Gly Met Lys Ile Ala Phe Asp Asp Val Ala His Lys Gly Ile Arg Asn
 210 215 220
 Ile Thr Pro Glu Asp Val Ala Val Ala Gln Glu Leu Gly Tyr Val Val
 225 230 235 240
 Lys Leu Val Gly Ser Ile Glu Glu Thr Ser Ser Gly Ile Ala Ala Glu
 245 250 255
 Val Thr Pro Thr Phe Leu Pro Lys Ala His Pro Leu Ala Ser Val Asn
 260 265 270
 Gly Val Met Asn Ala Val Phe Val Glu Ser Ile Gly Ile Gly Glu Ser
 275 280 285
 Met Tyr Tyr Gly Pro Gly Ala Gly Gln Lys Pro Thr Ala Thr Ser Val
 290 295 300
 Val Ala Asp Ile Val Arg Ile Val Arg Arg Leu Asn Asp Gly Thr Ile
 305 310 315 320
 Gly Lys Asp Phe Asn Glu Tyr Ser Arg Asp Leu Val Leu Ala Asn Pro
 325 330 335
 Glu Asp Val Lys Ala Asn Tyr Tyr Phe Ser Ile Leu Ala Leu Asp Ser
 340 345 350
 Lys Gly Gln Val Leu Lys Leu Ala Glu Ile Phe Asn Ala Gln Asp Ile
 355 360 365
 Ser Phe Lys Gln Ile Leu Gln Asp Gly Lys Glu Gly Asp Lys Ala Arg
 370 375 380
 Val Val Ile Ile Thr His Lys Ile Asn Lys Ala Gln Leu Glu Asn Val
 385 390 395 400
 Ser Ala Glu Leu Lys Lys Val Ser Glu Phe Asp Leu Leu Asn Thr Phe
 405 410 415

Lys Val Leu Gly Glu
420

<210> 41
<211> 1725
<212> DNA
<213> Streptococcus pneumoniae

<400> 41
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ttcaagctgt tagaagctgt ttttgagctc ttggttccca tgggtgattgc tgggattggt 120
gaccaatctt tacctcaggg agatcaagg catctctgga tgcagattgg cctgctcctt 180
atctttgcag taattggcgt tttagtggcc ttgatagctc aattttactc agcaaaggca 240
gcagtaggtt ctgctaagga attgacaaac gatctttatc gtcattattct ttccttgccc 300
aaggacagca gagaccgtct gacaacttct agtttgggtc ctgcgttgac ttcggatacc 360
taccagattc agactgggtt caatcaattc ctgcgtctct ttttacgagc gccattatc 420
gtttttgggtg ccatttttat ggcttatcga atctcagctg agttgacttt ctgggttctta 480
gtcttgggtg ccattttgac cattgtcatt gtagggttat ctcgattggg caatcctttc 540
tacagtagtc tcagaaagaa aacggaccaa ctggttcagg aaacgcgcca gcaattgcaa 600
gggatgcggg ttattcgtgc ttttgggtcaa gaaaaacgag agttacagat ttttcaaacc 660
cttaaccaag tttatgctag attacaagaa aagacagggt tctgggtctag tttattaaca 720
cctctgacct atctgattgt caatggaact cttctcgtaa ttatctggca aggctatatt 780
tcaattcaag gaggagtgtc cagtcaagggt gctctcattg ctcttatcaa ttacctctta 840
cagatttttg tggaattggg caagctagcc atgttgatca attccctcaa ccagtcctat 900
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attctaggta tcatcggggg aactggttct ggtaaatacaa gcttgggtgca actcttactt 1140
ggactttatc cagtagacaa ggggaacatt gacctttatc aaaatggacg tagtcctctt 1200
aatttgagc agtggcggtc ttggattgcc tatgtacctc aaaaggctcga actctttaa 1260
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gatgctctag ttgaggcagg ggggcgaaat ttctcagggt gacaaaaaca aagattgtct 1440
atcgcccag cagtcttgcc ccaggctccg ttctcatcc tagatgatgc aacctcggca 1500
ctggatacca ttacagagtc caagctctg aaagctatta gagaaaattt tccaaacacg 1560
agcttaattt tgatctctca acgaacctca actttacaga tggcggacca gattctcctc 1620
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gtctattgtg aaatcaatgc atcccaacat ggaaaggagg actag 1725

<210> 42
<211> 574
<212> PRT
<213> Streptococcus pneumoniae

<400> 42
Met Lys His Leu Leu Ser Tyr Phe Lys Pro Tyr Ile Lys Glu Ser Ile
1 5 10 15
Leu Ala Pro Leu Phe Lys Leu Leu Glu Ala Val Phe Glu Leu Leu Val
20 25 30
Pro Met Val Ile Ala Gly Ile Val Asp Gln Ser Leu Pro Gln Gly Asp
35 40 45

Gln Gly His Leu Trp Met Gln Ile Gly Leu Leu Leu Ile Phe Ala Val
 50 55 60

Ile Gly Val Leu Val Ala Leu Ile Ala Gln Phe Tyr Ser Ala Lys Ala
 65 70 75 80

Ala Val Gly Ser Ala Lys Glu Leu Thr Asn Asp Leu Tyr Arg His Ile
 85 90 95

Leu Ser Leu Pro Lys Asp Ser Arg Asp Arg Leu Thr Thr Ser Ser Leu
 100 105 110

Val Thr Arg Leu Thr Ser Asp Thr Tyr Gln Ile Gln Thr Gly Ile Asn
 115 120 125

Gln Phe Leu Arg Leu Phe Leu Arg Ala Pro Ile Ile Val Phe Gly Ala
 130 135 140

Ile Phe Met Ala Tyr Arg Ile Ser Ala Glu Leu Thr Phe Trp Phe Leu
 145 150 155 160

Val Leu Val Ala Ile Leu Thr Ile Val Ile Val Gly Leu Ser Arg Leu
 165 170 175

Val Asn Pro Phe Tyr Ser Ser Leu Arg Lys Lys Thr Asp Gln Leu Val
 180 185 190

Gln Glu Thr Arg Gln Gln Leu Gln Gly Met Arg Val Ile Arg Ala Phe
 195 200 205

Gly Gln Glu Lys Arg Glu Leu Gln Ile Phe Gln Thr Leu Asn Gln Val
 210 215 220

Tyr Ala Arg Leu Gln Glu Lys Thr Gly Phe Trp Ser Ser Leu Leu Thr
 225 230 235 240

Pro Leu Thr Tyr Leu Ile Val Asn Gly Thr Leu Leu Val Ile Ile Trp
 245 250 255

Gln Gly Tyr Ile Ser Ile Gln Gly Gly Val Leu Ser Gln Gly Ala Leu
 260 265 270

Ile Ala Leu Ile Asn Tyr Leu Leu Gln Ile Leu Val Glu Leu Val Lys
 275 280 285

Leu Ala Met Leu Ile Asn Ser Leu Asn Gln Ser Tyr Ile Ser Val Lys
 290 295 300

Arg Ile Glu Glu Val Phe Val Glu Ala Pro Glu Asp Ile His Ser Glu
 305 310 315 320

Leu Glu Gln Lys Gln Ala Thr Arg Asp Lys Val Leu Gln Val Gln Glu
 325 330 335

Leu Thr Phe Thr Tyr Pro Asp Ala Ala Gln Pro Ser Leu Arg Tyr Ile
 340 345 350

Ser Phe Asp Met Thr Gln Gly Gln Ile Leu Gly Ile Ile Gly Gly Thr
 355 360 365
 Gly Ser Gly Lys Ser Ser Leu Val Gln Leu Leu Leu Gly Leu Tyr Pro
 370 375 380
 Val Asp Lys Gly Asn Ile Asp Leu Tyr Gln Asn Gly Arg Ser Pro Leu
 385 390 395 400
 Asn Leu Glu Gln Trp Arg Ser Trp Ile Ala Tyr Val Pro Gln Lys Val
 405 410 415
 Glu Leu Phe Lys Gly Thr Ile Arg Ser Asn Leu Thr Leu Gly Phe Asn
 420 425 430
 Gln Glu Val Ser Asp Gln Glu Leu Trp Gln Ala Leu Glu Ile Ala Gln
 435 440 445
 Ala Lys Asp Phe Val Ser Glu Lys Glu Gly Leu Leu Asp Ala Leu Val
 450 455 460
 Glu Ala Gly Gly Arg Asn Phe Ser Gly Gly Gln Lys Gln Arg Leu Ser
 465 470 475 480
 Ile Ala Arg Ala Val Leu Arg Gln Ala Pro Phe Leu Ile Leu Asp Asp
 485 490 495
 Ala Thr Ser Ala Leu Asp Thr Ile Thr Glu Ser Lys Leu Leu Lys Ala
 500 505 510
 Ile Arg Glu Asn Phe Pro Asn Thr Ser Leu Ile Leu Ile Ser Gln Arg
 515 520 525
 Thr Ser Thr Leu Gln Met Ala Asp Gln Ile Leu Leu Leu Glu Lys Gly
 530 535 540
 Glu Leu Leu Ala Val Gly Lys His Asp Asp Leu Met Lys Ser Ser Gln
 545 550 555 560
 Val Tyr Cys Glu Ile Asn Ala Ser Gln His Gly Lys Glu Asp
 565 570

<210> 43

<211> 1224

<212> DNA

<213> Streptococcus pneumoniae

<400> 43

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 ctgcccattt tagggcagca ggtcgcctgg attgccttgg ggcttgtgat tggttttgtg 180
 gtcatgctct ttaatacaga atttctttgg aaggtgaccc cctttctata tatttttaggc 240
 ttgggactta tgatcttgcc gattgtattt tataatccaa gcttagttgc atcaacgggt 300
 gccaaaaact gggatcaat aaatggaatt accctattcc aaccgtcaga atttatgaag 360

atatacctata tcctcatggt ggctcgtgtc attgtccaat ttacaaagaa acataaggaa 420
 tggagacgca cggttccgct ggactttttg ttaattttct ggatgattct ctttaccatt 480
 ccagtcctag ttcttttagc acttcaaagt gacttgggga cggcttttgt tttttagacc 540
 attttctcag gaatcgtttt attatcaggg gtttcttgga aaattattat cccagtattt 600
 gtgactgctg taacaggagt tgctgggttc tttagctatct ttattagcaa ggacggacga 660
 gcttttcttc accagattgg aatgccgacc taccaaatta atcggatttt ggcttgggtc 720
 aatccctttg agtttgccca aacaacgact taccagcagg ctcaaggga gattgccatt 780
 gggagtgggt gcttatttgg tcagggattt aatgcttcga atctgcttat cccagttcga 840
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 gttattgccc tctatctcat gttgatttac cgtatgttga agattactct taaatcaaat 960
 aaccagttct acacttatat ttccacaggt ttgattatga tgttgctctt ccacatcttt 1020
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 gttgtattaa aacaaattaa ataa 1224

<210> 44

<211> 407

<212> PRT

<213> Streptococcus pneumoniae

<400> 44

Met Lys Arg Ser Leu Asp Ser Arg Val Asp Tyr Ser Leu Leu Leu Pro
 1 5 10 15

Val Phe Phe Leu Leu Val Ile Gly Val Val Ala Ile Tyr Ile Ala Val
 20 25 30

Ser His Asp Tyr Pro Asn Asn Ile Leu Pro Ile Leu Gly Gln Gln Val
 35 40 45

Ala Trp Ile Ala Leu Gly Leu Val Ile Gly Phe Val Val Met Leu Phe
 50 55 60

Asn Thr Glu Phe Leu Trp Lys Val Thr Pro Phe Leu Tyr Ile Leu Gly
 65 70 75 80

Leu Gly Leu Met Ile Leu Pro Ile Val Phe Tyr Asn Pro Ser Leu Val
 85 90 95

Ala Ser Thr Gly Ala Lys Asn Trp Val Ser Ile Asn Gly Ile Thr Leu
 100 105 110

Phe Gln Pro Ser Glu Phe Met Lys Ile Ser Tyr Ile Leu Met Leu Ala
 115 120 125

Arg Val Ile Val Gln Phe Thr Lys Lys His Lys Glu Trp Arg Arg Thr
 130 135 140

Val Pro Leu Asp Phe Leu Leu Ile Phe Trp Met Ile Leu Phe Thr Ile
 145 150 155 160

Pro Val Leu Val Leu Leu Ala Leu Gln Ser Asp Leu Gly Thr Ala Leu
 165 170 175

Val Phe Val Ala Ile Phe Ser Gly Ile Val Leu Leu Ser Gly Val Ser

180	185	190
Trp Lys Ile Ile Ile Pro Val Phe Val Thr Ala Val Thr Gly Val Ala		
195	200	205
Gly Phe Leu Ala Ile Phe Ile Ser Lys Asp Gly Arg Ala Phe Leu His		
210	215	220
Gln Ile Gly Met Pro Thr Tyr Gln Ile Asn Arg Ile Leu Ala Trp Leu		
225	230	235
Asn Pro Phe Glu Phe Ala Gln Thr Thr Thr Tyr Gln Gln Ala Gln Gly		
245	250	255
Gln Ile Ala Ile Gly Ser Gly Gly Leu Phe Gly Gln Gly Phe Asn Ala		
260	265	270
Ser Asn Leu Leu Ile Pro Val Arg Glu Ser Asp Met Ile Phe Thr Val		
275	280	285
Ile Ala Glu Asp Phe Gly Phe Ile Gly Ser Val Leu Val Ile Ala Leu		
290	295	300
Tyr Leu Met Leu Ile Tyr Arg Met Leu Lys Ile Thr Leu Lys Ser Asn		
305	310	315
Asn Gln Phe Tyr Thr Tyr Ile Ser Thr Gly Leu Ile Met Met Leu Leu		
325	330	335
Phe His Ile Phe Glu Asn Ile Gly Ala Val Thr Gly Leu Leu Pro Leu		
340	345	350
Thr Gly Ile Pro Leu Pro Phe Ile Ser Gln Gly Gly Ser Ala Ile Ile		
355	360	365
Ser Asn Leu Ile Gly Val Gly Leu Leu Leu Ser Met Ser Tyr Gln Thr		
370	375	380
Asn Leu Ala Glu Glu Lys Ser Gly Lys Val Pro Phe Lys Arg Lys Lys		
385	390	395
Val Val Leu Lys Gln Ile Lys		
405		

<210> 45
 <211> 1104
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 45
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 gagaagattc tatcaaccat tgtttcaa atcgatccag aaaagtatga tattgatatt 120
 cttgaaatgg agcactttga caaggatat gaatctgttc caaagcatgt acgcatttta 180
 aaatcccttc aagattatcg ccaaaccaga tggttacgag cttttttgtg gagaatgaga 240
 atttattttc caagactgac tcgtcgtttg cttgtaaaag atgattatga tgttgaagtt 300

tcttttacca ttatgaatcc accactgttg ttctctaaaa gaagagaagt caagaagata 360
tcttggttc atggaagtat tgaagaactt ctttaaggata gctctaaaag agaatacacat 420
agaagccagt tggatgctgc gaatacaatt gtagggattt caaaaaagac cagcaattct 480
atcaaggaag tttatccaga ttatacttct aaattacaga caatctacaa tggatatgat 540
tttcagacta ttctagaaaa atctcaagag aagatcgata tcgagattgc tcctcaaagt 600
atctgtacta tcggacggat tgaggaaaat aagggttctg accgtgtagt ggaagtgata 660
cgattattac accaagaggg aaaaaactat catctctatt ttatcggggc tggatgatg 720
gaagaggaac tgaaaaaacg agtcaaagag tatgggattg aggactatgt acatttcctt 780
ggttatcaaa aaaatcctta tcagtatcta tctcagacga aagttctttt gtctatgtct 840
aaacaagaag gttttcctgg agtgtatgtg gaggccttga gtctgggact cccttttatc 900
tctacggacg ttggaggggc tgaggaatta tccaagaag gacgatttgg acaaatacatt 960
gagagcaatc aagaggcagc tcaggcgatt actaattaca tgacttctgc ctcaaacttt 1020
gatgtcgatg aggctagcca attcattcaa caatttacia ttacaaaaca aatcgaacaa 1080
gtagaaaaac tattagagga gtag 1104

<210> 46

<211> 367

<212> PRT

<213> Streptococcus pneumoniae

<400> 46

Met Val Ala Lys Lys Lys Ile Leu Phe Phe Met Trp Ser Phe Ser Leu
1 5 10 15

Gly Gly Gly Ala Glu Lys Ile Leu Ser Thr Ile Val Ser Asn Leu Asp
20 25 30

Pro Glu Lys Tyr Asp Ile Asp Ile Leu Glu Met Glu His Phe Asp Lys
35 40 45

Gly Tyr Glu Ser Val Pro Lys His Val Arg Ile Leu Lys Ser Leu Gln
50 55 60

Asp Tyr Arg Gln Thr Arg Trp Leu Arg Ala Phe Leu Trp Arg Met Arg
65 70 75 80

Ile Tyr Phe Pro Arg Leu Thr Arg Arg Leu Leu Val Lys Asp Asp Tyr
85 90 95

Asp Val Glu Val Ser Phe Thr Ile Met Asn Pro Pro Leu Leu Phe Ser
100 105 110

Lys Arg Arg Glu Val Lys Lys Ile Ser Trp Ile His Gly Ser Ile Glu
115 120 125

Glu Leu Leu Lys Asp Ser Ser Lys Arg Glu Ser His Arg Ser Gln Leu
130 135 140

Asp Ala Ala Asn Thr Ile Val Gly Ile Ser Lys Lys Thr Ser Asn Ser
145 150 155 160

Ile Lys Glu Val Tyr Pro Asp Tyr Thr Ser Lys Leu Gln Thr Ile Tyr
165 170 175

Asn Gly Tyr Asp Phe Gln Thr Ile Leu Glu Lys Ser Gln Glu Lys Ile
180 185 190

Asp Ile Glu Ile Ala Pro Gln Ser Ile Cys Thr Ile Gly Arg Ile Glu
 195 200 205
 Glu Asn Lys Gly Ser Asp Arg Val Val Glu Val Ile Arg Leu Leu His
 210 215 220
 Gln Glu Gly Lys Asn Tyr His Leu Tyr Phe Ile Gly Ala Gly Asp Met
 225 230 235 240
 Glu Glu Glu Leu Lys Lys Arg Val Lys Glu Tyr Gly Ile Glu Asp Tyr
 245 250 255
 Val His Phe Leu Gly Tyr Gln Lys Asn Pro Tyr Gln Tyr Leu Ser Gln
 260 265 270
 Thr Lys Val Leu Leu Ser Met Ser Lys Gln Glu Gly Phe Pro Gly Val
 275 280 285
 Tyr Val Glu Ala Leu Ser Leu Gly Leu Pro Phe Ile Ser Thr Asp Val
 290 295 300
 Gly Gly Ala Glu Glu Leu Ser Gln Glu Gly Arg Phe Gly Gln Ile Ile
 305 310 315 320
 Glu Ser Asn Gln Glu Ala Ala Gln Ala Ile Thr Asn Tyr Met Thr Ser
 325 330 335
 Ala Ser Asn Phe Asp Val Asp Glu Ala Ser Gln Phe Ile Gln Gln Phe
 340 345 350
 Thr Ile Thr Lys Gln Ile Glu Gln Val Glu Lys Leu Leu Glu Glu
 355 360 365

<210> 47

<211> 987

<212> DNA

<213> Streptococcus pneumoniae

<400> 47

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 aaatcgatag cttccattca gaagcagacc tatcaaaatc tggaaattat tcttggtgat 120
 gatggtgcaa cagatgaaag tggtcgcttg tgtgattcaa tcgctgaaca agatgacagg 180
 gtgtcagtcg ttcataaaaa gaacgaagga ttgtcgcaag cacgaaatga tgggatgaag 240
 caggctcacg gggattatct gatttttatt gactcagatg attatatcca tccagaaatg 300
 attcagagct tatatgagca attagttcaa gaagatgcgg atgtttcgag ctgtggtgtc 360
 atgaatgtct atgctaata tgaagccca cagtcagcca atcaggatga ctattttgtc 420
 tgtgattctc aaacatttct aaaggaatac ctcatagggtg aaaaaatacc tgggacgatt 480
 tgcaataagc taatcaagag acagattgca actgccctat cctttcctaa ggggttgatt 540
 tacgaagatg cctattacca ttttgattta atcaagttgg ccaagaagta tgtggttaat 600
 actaaaccct attattacta tttccataga ggggatagta ttacgaccaa accctatgca 660
 gagaaggatt tagcctatat tgatatctac caaaagtttt ataataagat tgtgaaaaac 720
 taccctgact tgaaagaggt cgcttttttc agattggcct atgcccactt ctttattctg 780
 gataagatgt tgctagatga tcagtataaa cagtttgaag cctattctca gattcatcgt 840
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attagtgctt tggccctatt cataaatatt tccttatatc gattcttatt actgaaaaat 960
attgaaaaat ctaaaaaatt acattag 987

<210> 48

<211> 328

<212> PRT

<213> Streptococcus pneumoniae

<400> 48

Met Glu Thr Ala Leu Ile Ser Val Ile Val Pro Val Tyr Asn Val Ala
1 5 10 15

Gln Tyr Leu Glu Lys Ser Ile Ala Ser Ile Gln Lys Gln Thr Tyr Gln
20 25 30

Asn Leu Glu Ile Ile Leu Val Asp Asp Gly Ala Thr Asp Glu Ser Gly
35 40 45

Arg Leu Cys Asp Ser Ile Ala Glu Gln Asp Asp Arg Val Ser Val Leu
50 55 60

His Lys Lys Asn Glu Gly Leu Ser Gln Ala Arg Asn Asp Gly Met Lys
65 70 75 80

Gln Ala His Gly Asp Tyr Leu Ile Phe Ile Asp Ser Asp Asp Tyr Ile
85 90 95

His Pro Glu Met Ile Gln Ser Leu Tyr Glu Gln Leu Val Gln Glu Asp
100 105 110

Ala Asp Val Ser Ser Cys Gly Val Met Asn Val Tyr Ala Asn Asp Glu
115 120 125

Ser Pro Gln Ser Ala Asn Gln Asp Asp Tyr Phe Val Cys Asp Ser Gln
130 135 140

Thr Phe Leu Lys Glu Tyr Leu Ile Gly Glu Lys Ile Pro Gly Thr Ile
145 150 155 160

Cys Asn Lys Leu Ile Lys Arg Gln Ile Ala Thr Ala Leu Ser Phe Pro
165 170 175

Lys Gly Leu Ile Tyr Glu Asp Ala Tyr Tyr His Phe Asp Leu Ile Lys
180 185 190

Leu Ala Lys Lys Tyr Val Val Asn Thr Lys Pro Tyr Tyr Tyr Tyr Phe
195 200 205

His Arg Gly Asp Ser Ile Thr Thr Lys Pro Tyr Ala Glu Lys Asp Leu
210 215 220

Ala Tyr Ile Asp Ile Tyr Gln Lys Phe Tyr Asn Glu Val Val Lys Asn
225 230 235 240

Tyr Pro Asp Leu Lys Glu Val Ala Phe Phe Arg Leu Ala Tyr Ala His
245 250 255

Phe Phe Ile Leu Asp Lys Met Leu Leu Asp Asp Gln Tyr Lys Gln Phe
 260 265 270

Glu Ala Tyr Ser Gln Ile His Arg Phe Leu Lys Gly His Ala Phe Ala
 275 280 285

Ile Ser Arg Asn Pro Ile Phe Arg Lys Gly Arg Arg Ile Ser Ala Leu
 290 295 300

Ala Leu Phe Ile Asn Ile Ser Leu Tyr Arg Phe Leu Leu Leu Lys Asn
 305 310 315 320

Ile Glu Lys Ser Lys Lys Leu His
 325

<210> 49

<211> 735

<212> DNA

<213> Streptococcus pneumoniae

<400> 49

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 ggtctagcag ggagaaatgg agttggtaag agtacgttga tgaaaattct tgttcagaat 180
 aatcaaccga cttcaggtta tattataagc agtgataatg ttgggtattt aatcgaagaa 240
 ccaaaattat ttttatctaa aacagggttta gagaatttaa aatatttgct aaatttatat 300
 ggtgttgact acaatcaaga aagatttaga tgtttgatcc aagagttaga tttgactcag 360
 tctattaata aaaaagtaaa gacctattct ttgggtacaa aacaaaaatt agctttgctt 420
 ctaactctcg ttacggaacc tgatatattg attttagatg aaccgactaa tgggttagat 480
 attgaatcat cacaaatagt tttagcgggt ctaaaaaaat tagctttaca tgaaaatgtg 540
 ggaattttta tatcgagtca taaattagaa gacattgaag aaatttggtga gagagttcct 600
 ttcttgaggaga acgggctttt gacatttcaa aaagtaggaa aagatagtca taatttcttg 660
 tttgagatag ctttttcacg agctacagat agagacattt tcattaccaa acaagaattt 720
 tgggatattg tttag 735

<210> 50

<211> 244

<212> PRT

<213> Streptococcus pneumoniae

<400> 50

Met Arg Ile Lys Glu Lys Thr Asn Asn Ile Asn Gly Gly Ile Lys Asn
 1 5 10 15

Val Ser Lys His Tyr Gly His Ser Ile Ile Leu Lys Asp Ile Asn Phe
 20 25 30

Ala Leu Asn Lys Gly Glu Ile Val Gly Leu Ala Gly Arg Asn Gly Val
 35 40 45

Gly Lys Ser Thr Leu Met Lys Ile Leu Val Gln Asn Asn Gln Pro Thr
 50 55 60

Ser Gly Asn Ile Ile Ser Ser Asp Asn Val Gly Tyr Leu Ile Glu Glu
 65 70 75 80
 Pro Lys Leu Phe Leu Ser Lys Thr Gly Leu Glu Asn Leu Lys Tyr Leu
 85 90 95
 Ser Asn Leu Tyr Gly Val Asp Tyr Asn Gln Glu Arg Phe Arg Cys Leu
 100 105 110
 Ile Gln Glu Leu Asp Leu Thr Gln Ser Ile Asn Lys Lys Val Lys Thr
 115 120 125
 Tyr Ser Leu Gly Thr Lys Gln Lys Leu Ala Leu Leu Leu Thr Leu Val
 130 135 140
 Thr Glu Pro Asp Ile Leu Ile Leu Asp Glu Pro Thr Asn Gly Leu Asp
 145 150 155 160
 Ile Glu Ser Ser Gln Ile Val Leu Ala Val Leu Lys Lys Leu Ala Leu
 165 170 175
 His Glu Asn Val Gly Ile Leu Ile Ser Ser His Lys Leu Glu Asp Ile
 180 185 190
 Glu Glu Ile Cys Glu Arg Val Leu Phe Leu Glu Asn Gly Leu Leu Thr
 195 200 205
 Phe Gln Lys Val Gly Lys Asp Ser His Asn Phe Leu Phe Glu Ile Ala
 210 215 220
 Phe Ser Ser Ala Thr Asp Arg Asp Ile Phe Ile Thr Lys Gln Glu Phe
 225 230 235 240
 Trp Asp Ile Val

<210> 51

<211> 1704

<212> DNA

<213> Streptococcus pneumoniae

<400> 51

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 aaccgtgcta tgcttcgtgc gactggtatg acagataagg actttgaaac atcgattgtg 120
 ggagtgattt cgacttgggc ggaaaataca ccatgtaaca ttcacttgca tgatttcggg 180
 aaactggcta aagaaggtgt caaatctgca ggcgcttggc ctgtacagtt tggaaccatt 240
 accgtagcgg acgggatcgc tatgggaacg cctggtatgc gtttctctct aacatctcgt 300
 gacatcatcg cggactccat cgaggcggct atgagtggtc acaacgtgga tgccttcgtc 360
 gctatcggtg gctgtgacaa gaacatgcct ggatctatga ttgctattgc taatatggat 420
 atcccagcta ttttcgccta tgggtggaact attgcaccgg gaaatcttga tggtaaagat 480
 atcgacttgg tttctgtctt tgaaggatc ggaaaatgga accacggtga catgacagct 540
 gaggacgtga aacgtcttga atgtaatgcc tgccctggcc ctggtggttg tgggtggtatg 600
 tatactgcta ataccatggc aactgctatc gaagttctag ggatgagttt gccagggtca 660
 tcctctcacc cagctgaatc agctgataag aaagaagata tcgaagcagc aggacgtgct 720
 gttgttaaga tggttgaact tgggtctcaa ccatcagata tcttgactcg tgaagccttt 780

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gaagatgcta tcaactgtaac gatggctctc ggtgggttcta caaacgccac tcttcacttg 840
ctcgccattg cccatgccgc aaatggtgac ttgtcacttg aggacttcaa tacgattcaa 900
gaacgtgtgc ctcaactggc cgacttgaaa ccatctgggc agtatgtctt ccaagacctc 960
tacgaagtcg gtggtgtccc tgcggttatg aagtatttgt tggcaaattg tttccttcac 1020
ggagatcgca tcacatgtac tggtaagact gtagctgaaa acttggctga ctttgagac 1080
ttgactccag gccaaaaagt tatcatgcca cttgaaaatc caaaacgtgc ggatgggtccg 1140
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aaagtgcgtc gtcacgttgg gccagctaag gtctttgact cagaagaaga tgcgattcag 1260
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cagggagata aggtggccct cttgacggac ggacgtttct ctggtggtac ttatggtctg 1440
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ggcgatatcg ttacggttga ccaagatacc aaagaaattt ctatggccgt atccgaagaa 1560
gaacttga aaacgaaggc agaaacaacc ttgccaccac tttacagccg tgggtgtcctc 1620
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atggacaagt caggtaaaaa ataa 1704

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<210> 52

<211> 567

<212> PRT

<213> Streptococcus pneumoniae

<400> 52

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Met Thr Glu Leu Asp Lys Arg His Arg Ser Ser Ile Tyr Asp Ser Met
  1              5              10              15

```

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Val Lys Ser Pro Asn Arg Ala Met Leu Arg Ala Thr Gly Met Thr Asp
      20              25              30

```

```

Lys Asp Phe Glu Thr Ser Ile Val Gly Val Ile Ser Thr Trp Ala Glu
      35              40              45

```

```

Asn Thr Pro Cys Asn Ile His Leu His Asp Phe Gly Lys Leu Ala Lys
      50              55              60

```

```

Glu Gly Val Lys Ser Ala Gly Ala Trp Pro Val Gln Phe Gly Thr Ile
      65              70              75              80

```

```

Thr Val Ala Asp Gly Ile Ala Met Gly Thr Pro Gly Met Arg Phe Ser
      85              90              95

```

```

Leu Thr Ser Arg Asp Ile Ile Ala Asp Ser Ile Glu Ala Ala Met Ser
      100             105             110

```

```

Gly His Asn Val Asp Ala Phe Val Ala Ile Gly Gly Cys Asp Lys Asn
      115             120             125

```

```

Met Pro Gly Ser Met Ile Ala Ile Ala Asn Met Asp Ile Pro Ala Ile
      130             135             140

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```

Phe Ala Tyr Gly Gly Thr Ile Ala Pro Gly Asn Leu Asp Gly Lys Asp
      145             150             155             160

```

```

Ile Asp Leu Val Ser Val Phe Glu Gly Ile Gly Lys Trp Asn His Gly
      165             170             175

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Asp Met Thr Ala Glu Asp Val Lys Arg Leu Glu Cys Asn Ala Cys Pro
 180 185 190
 Gly Pro Gly Gly Cys Gly Gly Met Tyr Thr Ala Asn Thr Met Ala Thr
 195 200 205
 Ala Ile Glu Val Leu Gly Met Ser Leu Pro Gly Ser Ser Ser His Pro
 210 215 220
 Ala Glu Ser Ala Asp Lys Lys Glu Asp Ile Glu Ala Ala Gly Arg Ala
 225 230 235 240
 Val Val Lys Met Leu Glu Leu Gly Leu Lys Pro Ser Asp Ile Leu Thr
 245 250 255
 Arg Glu Ala Phe Glu Asp Ala Ile Thr Val Thr Met Ala Leu Gly Gly
 260 265 270
 Ser Thr Asn Ala Thr Leu His Leu Leu Ala Ile Ala His Ala Ala Asn
 275 280 285
 Val Asp Leu Ser Leu Glu Asp Phe Asn Thr Ile Gln Glu Arg Val Pro
 290 295 300
 His Leu Ala Asp Leu Lys Pro Ser Gly Gln Tyr Val Phe Gln Asp Leu
 305 310 315 320
 Tyr Glu Val Gly Gly Val Pro Ala Val Met Lys Tyr Leu Leu Ala Asn
 325 330 335
 Gly Phe Leu His Gly Asp Arg Ile Thr Cys Thr Gly Lys Thr Val Ala
 340 345 350
 Glu Asn Leu Ala Asp Phe Ala Asp Leu Thr Pro Gly Gln Lys Val Ile
 355 360 365
 Met Pro Leu Glu Asn Pro Lys Arg Ala Asp Gly Pro Leu Ile Ile Leu
 370 375 380
 Asn Gly Asn Leu Ala Pro Asp Gly Ala Val Ala Lys Val Ser Gly Val
 385 390 395 400
 Lys Val Arg Arg His Val Gly Pro Ala Lys Val Phe Asp Ser Glu Glu
 405 410 415
 Asp Ala Ile Gln Ala Val Leu Thr Asp Glu Ile Val Asp Gly Asp Val
 420 425 430
 Val Val Val Arg Phe Val Gly Pro Lys Gly Gly Pro Gly Met Pro Glu
 435 440 445
 Met Leu Ser Leu Ser Ser Met Ile Val Gly Lys Gly Gln Gly Asp Lys
 450 455 460
 Val Ala Leu Leu Thr Asp Gly Arg Phe Ser Gly Gly Thr Tyr Gly Leu
 465 470 475 480

Val Val Gly His Ile Ala Pro Glu Ala Gln Asp Gly Gly Pro Ile Ala
485 490 495

Tyr Leu Arg Thr Gly Asp Ile Val Thr Val Asp Gln Asp Thr Lys Glu
500 505 510

Ile Ser Met Ala Val Ser Glu Glu Glu Leu Glu Lys Arg Lys Ala Glu
515 520 525

Thr Thr Leu Pro Pro Leu Tyr Ser Arg Gly Val Leu Gly Lys Tyr Ala
530 535 540

His Ile Val Ser Ser Ala Ser Arg Gly Ala Val Thr Asp Phe Trp Asn
545 550 555 560

Met Asp Lys Ser Gly Lys Lys
565

<210> 53
<211> 274
<212> DNA
<213> Streptococcus pneumoniae

<400> 53
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ggatattctt gcaagatact atcgtcagaa gggagaggaa gttttatatg tttctggaag 180
tgattgtaat ggaacccta tttctatcag agctaaaaaa gaaaataagt ctgtgaaaga 240
aattgctgat ttttatcata aggaatttaa tcca 274

<210> 54
<211> 91
<212> PRT
<213> Streptococcus pneumoniae

<400> 54
Cys Tyr Asn Lys Asn Lys Glu Phe Lys Glu Lys Tyr Asn Met Ser Ile
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Phe Ile Gly Gly Ala Trp Pro Tyr Ala Asn Gly Ser Leu His Ile Gly
20 25 30

His Ala Ala Ala Leu Leu Pro Gly Asp Ile Leu Ala Arg Tyr Tyr Arg
35 40 45

Gln Lys Gly Glu Glu Val Leu Tyr Val Ser Gly Ser Asp Cys Asn Gly
50 55 60

Thr Pro Ile Ser Ile Arg Ala Lys Lys Glu Asn Lys Ser Val Lys Glu
65 70 75 80

Ile Ala Asp Phe Tyr His Lys Glu Phe Asn Pro
85 90

<210> 55
 <211> 1065
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 55
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 acagatggct tgggtgggtat ttttggtatc aaacattcag aagctgtgga tgcaccgcgc 180
 gtcttggtcg cttctcatat ggacgaagtt ggttttatgg tcagcgaaat caagccagat 240
 ggtaccttcc gtgtcgtaga aatcggtggc tggaacccca tgggtggtag cagccaacgt 300
 ttcaaactct tgactcgtga tggatcatgaa attcctgtga tttcagggttc tgttcctccg 360
 catttgactc gtggaaaggg gggaccaacc atgccagcca ttgccgatat cgtttttgat 420
 ggtggttttg cggacaaggc tgaggcagaa agttttggca tccgtcctgg tgataccatt 480
 gtaccagata gttctgcaat tttgacagcc aatgaaaaaa atatcatctc aaaagcttgg 540
 gataaccgct acggtgtcct catggtaagc gagctagctg aagctttatc ggggtcaaaaa 600
 ctcggaatg aactctatct gggttctaac gtccaagaag aagttggtct gcgtggcgct 660
 catacctcta caaccaagtt tgaccagaa gtcttcctcg cagttgattg ctcaccagca 720
 ggtgatgtct acggtgggtca aggaagatt ggagatggaa ccttgattcg tttctatgat 780
 ccaggtcact tgcttctccc agggatgaag gatttccttt tgacaacggc tgaagaagct 840
 ggtatcaagt accaatacta ctgtggtaaa ggcggaacag atgcagggtg agctcatctg 900
 aaaaatggtg gtgtcccatc aacaactatc ggtgtctgct ctcgttatat ccattctcac 960
 caaacctct atgcaatgga tgacttcta gaagcgcaag ctttcttaca agccttggtg 1020
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<210> 56
 <211> 354
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 56
 Met Thr Thr Leu Phe Ser Lys Ile Lys Glu Val Thr Glu Leu Ala Ala
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 Val Ser Gly His Glu Ala Pro Val Arg Ala Tyr Leu Arg Glu Lys Leu
 20 25 30
 Thr Pro His Val Asp Glu Val Val Thr Asp Gly Leu Gly Gly Ile Phe
 35 40 45
 Gly Ile Lys His Ser Glu Ala Val Asp Ala Pro Arg Val Leu Val Ala
 50 55 60
 Ser His Met Asp Glu Val Gly Phe Met Val Ser Glu Ile Lys Pro Asp
 65 70 75 80
 Gly Thr Phe Arg Val Val Glu Ile Gly Gly Trp Asn Pro Met Val Val
 85 90 95
 Ser Ser Gln Arg Phe Lys Leu Leu Thr Arg Asp Gly His Glu Ile Pro
 100 105 110
 Val Ile Ser Gly Ser Val Pro Pro His Leu Thr Arg Gly Lys Gly Gly
 115 120 125

Pro Thr Met Pro Ala Ile Ala Asp Ile Val Phe Asp Gly Gly Phe Ala
 130 135 140

Asp Lys Ala Glu Ala Glu Ser Phe Gly Ile Arg Pro Gly Asp Thr Ile
 145 150 155 160

Val Pro Asp Ser Ser Ala Ile Leu Thr Ala Asn Glu Lys Asn Ile Ile
 165 170 175

Ser Lys Ala Trp Asp Asn Arg Tyr Gly Val Leu Met Val Ser Glu Leu
 180 185 190

Ala Glu Ala Leu Ser Gly Gln Lys Leu Gly Asn Glu Leu Tyr Leu Gly
 195 200 205

Ser Asn Val Gln Glu Glu Val Gly Leu Arg Gly Ala His Thr Ser Thr
 210 215 220

Thr Lys Phe Asp Pro Glu Val Phe Leu Ala Val Asp Cys Ser Pro Ala
 225 230 235 240

Gly Asp Val Tyr Gly Gly Gln Gly Lys Ile Gly Asp Gly Thr Leu Ile
 245 250 255

Arg Phe Tyr Asp Pro Gly His Leu Leu Leu Pro Gly Met Lys Asp Phe
 260 265 270

Leu Leu Thr Thr Ala Glu Glu Ala Gly Ile Lys Tyr Gln Tyr Tyr Cys
 275 280 285

Gly Lys Gly Gly Thr Asp Ala Gly Ala Ala His Leu Lys Asn Gly Gly
 290 295 300

Val Pro Ser Thr Thr Ile Gly Val Cys Ala Arg Tyr Ile His Ser His
 305 310 315 320

Gln Thr Leu Tyr Ala Met Asp Asp Phe Leu Glu Ala Gln Ala Phe Leu
 325 330 335

Gln Ala Leu Val Lys Lys Leu Asp Arg Ser Thr Val Asp Leu Ile Lys
 340 345 350

His Tyr

<210> 57

<211> 1182

<212> DNA

<213> Streptococcus pneumoniae

<400> 57

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 actcttttga cttggatgaa cacttctccc caattcatga ttccaggact agctttaaca 120
 agcctatctc tgacttttat cctagccact cgtctccac tactagaaag ctggtttcac 180

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agtttggaga aggtctacac cgtccacaaa ttcacagcct ttctctcaat catcctacta 240
atctttcata acttttagtat gggcggtttg tggggctctc gcttagctgc tcagtttggc 300
aatcttgcca tctatatctt tgccagcatc atccttgctg cctatttagg caaatacatc 360
caatacgaag cttggcgatg gattcaccgc ctggtttacc tagcctatat tttaggactc 420
tttcacatct acatgataat gggcaatcgt ctccctacat ttaatcttct aagttttctt 480
gttggtagct atgccctttt aggcttacta gctggttttt atatcatttt tctatatcaa 540
aagatttcct tcccctatct agggaaaatt acccatctca aacgcttaaa tcacgatact 600
agagaaattc aaatccatct tagcagacct ttcaactatc aatcaggaca atttgccttt 660
ctaaagattt tccaagaagg ctttgaaagt gctccgcac ccttttctat ctcaggaggt 720
catggtcaaa ctctttactt tactgttaaa acttcaggcg accataccaa gaatatctat 780
gataatcttc aagccggcag caaagtaacc ctagacagag cttacggaca catgatcata 840
gaagaaggac gagaaaatca ggtttggatt gctggaggta ttgggatcac ccccttcac 900
tcttacatcc gtgaacatcc tattttagat aaacaggttc acttctacta tagcttccgt 960
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tttgaactcc atctaatacga cagtacgaaa gacggctatc ttaattttga acaaaaagaa 1080
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```

<210> 58

<211> 394

<212> PRT

<213> Streptococcus pneumoniae

<400> 58

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Met Glu Phe Ser Met Lys Ser Val Lys Gly Leu Leu Phe Ile Ile Ala
  1             5             10             15

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```

Ser Phe Ile Leu Thr Leu Leu Thr Trp Met Asn Thr Ser Pro Gln Phe
      20             25             30

```

```

Met Ile Pro Gly Leu Ala Leu Thr Ser Leu Ser Leu Thr Phe Ile Leu
      35             40             45

```

```

Ala Thr Arg Leu Pro Leu Leu Glu Ser Trp Phe His Ser Leu Glu Lys
      50             55             60

```

```

Val Tyr Thr Val His Lys Phe Thr Ala Phe Leu Ser Ile Ile Leu Leu
      65             70             75             80

```

```

Ile Phe His Asn Phe Ser Met Gly Gly Leu Trp Gly Ser Arg Leu Ala
      85             90             95

```

```

Ala Gln Phe Gly Asn Leu Ala Ile Tyr Ile Phe Ala Ser Ile Ile Leu
      100            105            110

```

```

Val Ala Tyr Leu Gly Lys Tyr Ile Gln Tyr Glu Ala Trp Arg Trp Ile
      115            120            125

```

```

His Arg Leu Val Tyr Leu Ala Tyr Ile Leu Gly Leu Phe His Ile Tyr
      130            135            140

```

```

Met Ile Met Gly Asn Arg Leu Leu Thr Phe Asn Leu Leu Ser Phe Leu
      145            150            155            160

```

```

Val Gly Ser Tyr Ala Leu Leu Gly Leu Leu Ala Gly Phe Tyr Ile Ile
      165            170            175

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Phe Leu Tyr Gln Lys Ile Ser Phe Pro Tyr Leu Gly Lys Ile Thr His
180 185 190
Leu Lys Arg Leu Asn His Asp Thr Arg Glu Ile Gln Ile His Leu Ser
195 200 205
Arg Pro Phe Asn Tyr Gln Ser Gly Gln Phe Ala Phe Leu Lys Ile Phe
210 215 220
Gln Glu Gly Phe Glu Ser Ala Pro His Pro Phe Ser Ile Ser Gly Gly
225 230 235 240
His Gly Gln Thr Leu Tyr Phe Thr Val Lys Thr Ser Gly Asp His Thr
245 250 255
Lys Asn Ile Tyr Asp Asn Leu Gln Ala Gly Ser Lys Val Thr Leu Asp
260 265 270
Arg Ala Tyr Gly His Met Ile Ile Glu Glu Gly Arg Glu Asn Gln Val
275 280 285
Trp Ile Ala Gly Gly Ile Gly Ile Thr Pro Phe Ile Ser Tyr Ile Arg
290 295 300
Glu His Pro Ile Leu Asp Lys Gln Val His Phe Tyr Tyr Ser Phe Arg
305 310 315 320
Gly Asp Glu Asn Ala Val Tyr Leu Asp Leu Leu Arg Asn Tyr Ala Gln
325 330 335
Lys Asn Pro Asn Phe Glu Leu His Leu Ile Asp Ser Thr Lys Asp Gly
340 345 350
Tyr Leu Asn Phe Glu Gln Lys Glu Val Pro Glu His Ala Thr Val Tyr
355 360 365
Met Cys Gly Pro Ile Ser Met Met Lys Ala Leu Ala Lys Gln Ile Lys
370 375 380
Lys Gln Asn Pro Lys Thr Glu His Ile Tyr
385 390

<210> 59

<211> 900

<212> DNA

<213> Streptococcus pneumoniae

<400> 59

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cgcaataaaa tcatgggaat ttacacgact gataaggagc aaattgtctt tatcgacaca 180
ccagggattc acaagcctaa aacagctctc ggagatttca tgggtgagtc tgcctacagt 240
acccttcgcg aagtggacac tggtcttttc atggtgcctg ctgatgaagc gcgtggtaag 300
ggggacgata tgattatcga gcgtctcaag gctgccaagg ttcctgtgat ttggtggtg 360

aataaaatcg ataaggtcca tccagaccag ctcttgctc agattgatga cttccgtaat 420
caaatggact ttaaggaaat tgttccaatc tcagcccttc agggaaataa cgtgtctcgt 480
ctagtggata ttttgagtga aaatctggat gaaggtttcc aatatttccc gtctgatcaa 540
atcacagacc atccagaacg tttcttggtt tcagaaatgg ttcgcgagaa agtcttgcac 600
ctaactcgtg aagagattcc gcattctgta gcagtagttg ttgactctat gaaacgagac 660
gaagagacag acaaggttca catccgtgca accatcatgg tcgagcgcga tagccaaaaa 720
gggattatca tcggtaaagg tggcgctatg cttaagaaaa tcggtagcat ggcccgtcgt 780
gatatcgaac tcatgctagg agacaaggtc ttctagaaa cctgggtcaa ggtcaagaaa 840
aactggcgcg ataaaaagct agatttggct gactttggct ataataaaag agaatactaa 900

<210> 60

<211> 299

<212> PRT

<213> Streptococcus pneumoniae

<400> 60

Met Thr Phe Lys Ser Gly Phe Val Ala Ile Leu Gly Arg Pro Asn Val
1 5 10 15

Gly Lys Ser Thr Phe Leu Asn His Val Met Gly Gln Lys Ile Ala Ile
20 25 30

Met Ser Asp Lys Ala Gln Thr Thr Arg Asn Lys Ile Met Gly Ile Tyr
35 40 45

Thr Thr Asp Lys Glu Gln Ile Val Phe Ile Asp Thr Pro Gly Ile His
50 55 60

Lys Pro Lys Thr Ala Leu Gly Asp Phe Met Val Glu Ser Ala Tyr Ser
65 70 75 80

Thr Leu Arg Glu Val Asp Thr Val Leu Phe Met Val Pro Ala Asp Glu
85 90 95

Ala Arg Gly Lys Gly Asp Asp Met Ile Ile Glu Arg Leu Lys Ala Ala
100 105 110

Lys Val Pro Val Ile Leu Val Val Asn Lys Ile Asp Lys Val His Pro
115 120 125

Asp Gln Leu Leu Ser Gln Ile Asp Asp Phe Arg Asn Gln Met Asp Phe
130 135 140

Lys Glu Ile Val Pro Ile Ser Ala Leu Gln Gly Asn Asn Val Ser Arg
145 150 155 160

Leu Val Asp Ile Leu Ser Glu Asn Leu Asp Glu Gly Phe Gln Tyr Phe
165 170 175

Pro Ser Asp Gln Ile Thr Asp His Pro Glu Arg Phe Leu Val Ser Glu
180 185 190

Met Val Arg Glu Lys Val Leu His Leu Thr Arg Glu Glu Ile Pro His
195 200 205

Ser Val Ala Val Val Val Asp Ser Met Lys Arg Asp Glu Glu Thr Asp

210 215 220
 Lys Val His Ile Arg Ala Thr Ile Met Val Glu Arg Asp Ser Gln Lys
 225 230 235 240
 Gly Ile Ile Ile Gly Lys Gly Gly Ala Met Leu Lys Lys Ile Gly Ser
 245 250 255
 Met Ala Arg Arg Asp Ile Glu Leu Met Leu Gly Asp Lys Val Phe Leu
 260 265 270
 Glu Thr Trp Val Lys Val Lys Lys Asn Trp Arg Asp Lys Lys Leu Asp
 275 280 285
 Leu Ala Asp Phe Gly Tyr Asn Glu Arg Glu Tyr
 290 295

<210> 61
 <211> 855
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 61
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 cccaagatga ttaagacgga tttggaagag tttcaaaggg aattgcctag tcagattatc 180
 gagtcaatgg gacgtcgtgg aaaatatttg cttttttatc tgacagacaa ggtcttgatt 240
 tcccatttgc ggatggaggg caagtatttt tactatccag accaaggacc tgaacgcaag 300
 catgccccatg ttttctttca ttttgaagat ggtggcacgc ttgtttatga ggatgttcgc 360
 aagtttggaa ccatggaact cttggtgcct gaccttttag acgtctactt tatttctaaa 420
 aaattaggtc ctgaaccaag cgaacaagac tttgatttac aggtcctttca atctgccctt 480
 gccaagtcca aaaagcctat caaatcccat ctccatagacc agaccttggg agctggactt 540
 ggcaatatct atgtggatga ggttctcttg cgagctcagg ttcattccagc tagaccttcc 600
 cagactttga cagcagaaga agcgactgcc attcatgacc agaccattgc tgttttgggc 660
 caggctgttg aaaaaggtgg ctccaccatt cggacttata ccaatgcctt tggggaagat 720
 ggaagcatgc aggactttca tcaggtctat gataagactg gtcaagaatg tgtacgctgt 780
 ggtaccatca ttgagaaaat tcaactaggc ggacgtggaa cccacttttg tccaaactgt 840
 caaaggaggg actga 855

<210> 62
 <211> 284
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 62
 Met Leu Leu Val Phe Thr Glu Gly Gly Leu Met Pro Glu Leu Pro Glu
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 Val Glu Thr Val Cys Arg Gly Leu Glu Lys Leu Ile Ile Gly Lys Lys
 20 25 30
 Ile Ser Ser Ile Glu Ile Arg Tyr Pro Lys Met Ile Lys Thr Asp Leu
 35 40 45

Glu Glu Phe Gln Arg Glu Leu Pro Ser Gln Ile Ile Glu Ser Met Gly
 50 55 60
 Arg Arg Gly Lys Tyr Leu Leu Phe Tyr Leu Thr Asp Lys Val Leu Ile
 65 70 75 80
 Ser His Leu Arg Met Glu Gly Lys Tyr Phe Tyr Tyr Pro Asp Gln Gly
 85 90 95
 Pro Glu Arg Lys His Ala His Val Phe Phe His Phe Glu Asp Gly Gly
 100 105 110
 Thr Leu Val Tyr Glu Asp Val Arg Lys Phe Gly Thr Met Glu Leu Leu
 115 120 125
 Val Pro Asp Leu Leu Asp Val Tyr Phe Ile Ser Lys Lys Leu Gly Pro
 130 135 140
 Glu Pro Ser Glu Gln Asp Phe Asp Leu Gln Val Phe Gln Ser Ala Leu
 145 150 155 160
 Ala Lys Ser Lys Lys Pro Ile Lys Ser His Leu Leu Asp Gln Thr Leu
 165 170 175
 Val Ala Gly Leu Gly Asn Ile Tyr Val Asp Glu Val Leu Trp Arg Ala
 180 185 190
 Gln Val His Pro Ala Arg Pro Ser Gln Thr Leu Thr Ala Glu Glu Ala
 195 200 205
 Thr Ala Ile His Asp Gln Thr Ile Ala Val Leu Gly Gln Ala Val Glu
 210 215 220
 Lys Gly Gly Ser Thr Ile Arg Thr Tyr Thr Asn Ala Phe Gly Glu Asp
 225 230 235 240
 Gly Ser Met Gln Asp Phe His Gln Val Tyr Asp Lys Thr Gly Gln Glu
 245 250 255
 Cys Val Arg Cys Gly Thr Ile Ile Glu Lys Ile Gln Leu Gly Gly Arg
 260 265 270
 Gly Thr His Phe Cys Pro Asn Cys Gln Arg Arg Asp
 275 280

<210> 63

<211> 633

<212> DNA

<213> Streptococcus pneumoniae

<400> 63

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 gccgacgcag tcgtccacca actacagaaa cctgggtggc gtctgtttga ggctctagta 180
 cagcactttg ggcaagaaat cattcttgaa aacggagaac tcaatcgccc tctcctagct 240

agtctcatct tttcaaattcc tgatgaacga gaatgggtcta agcaaattca aggggagatt 300
 atccgtgagg aactgggtac tttgagagaa cagttgggtc agacagaaga gattttcttc 360
 atggatattc ccctactttt tgagcaggac tacagcgatt ggtttgctga gacttggttg 420
 gtctatgtgg accgagatgc ccaagtggaa cgcttaatga aaagggacca gttgtccaaa 480
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 agccaggttc ttgataataa tggcaatcag aaccagcttc ttaatcaagt gcatatcctt 600
 cttgaggagg gtaggcaaga tgacagagat taa 633

<210> 64

<211> 210

<212> PRT

<213> Streptococcus pneumoniae

<400> 64

Met Ser Lys Leu Ser Lys Glu Gly Leu Met Gly Lys Ile Ile Gly Ile
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Thr Gly Gly Ile Ala Ser Gly Lys Ser Thr Val Thr Asn Phe Leu Arg
 20 25 30

Gln Gln Gly Phe Gln Val Val Asp Ala Asp Ala Val Val His Gln Leu
 35 40 45

Gln Lys Pro Gly Gly Arg Leu Phe Glu Ala Leu Val Gln His Phe Gly
 50 55 60

Gln Glu Ile Ile Leu Glu Asn Gly Glu Leu Asn Arg Pro Leu Leu Ala
 65 70 75 80

Ser Leu Ile Phe Ser Asn Pro Asp Glu Arg Glu Trp Ser Lys Gln Ile
 85 90 95

Gln Gly Glu Ile Ile Arg Glu Glu Leu Ala Thr Leu Arg Glu Gln Leu
 100 105 110

Ala Gln Thr Glu Glu Ile Phe Phe Met Asp Ile Pro Leu Leu Phe Glu
 115 120 125

Gln Asp Tyr Ser Asp Trp Phe Ala Glu Thr Trp Leu Val Tyr Val Asp
 130 135 140

Arg Asp Ala Gln Val Glu Arg Leu Met Lys Arg Asp Gln Leu Ser Lys
 145 150 155 160

Asp Glu Ala Glu Ser Arg Leu Ala Ala Gln Trp Pro Leu Glu Lys Lys
 165 170 175

Lys Asp Leu Ala Ser Gln Val Leu Asp Asn Asn Gly Asn Gln Asn Gln
 180 185 190

Leu Leu Asn Gln Val His Ile Leu Leu Glu Gly Gly Arg Gln Asp Asp
 195 200 205

Arg Asp
 210

<210> 65
 <211> 1269
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 65
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 gctgctattt tgactatttg ctttatcaag gaagattttc aaccagtagc caaggaaaag 660
 gctattccaa caaaggaatt atttacctcg gttaaatac cctatctttt gctcaatctc 720
 tttttaacca gttttgtcat ccaattttca gctcaatcga ttggccctat tttggctctt 780
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 gaaatctag 1269

<210> 66
 <211> 422
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 66
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 Leu Arg Ile Ala Trp Phe Gly Asn Phe Leu Thr Gly Ala Ser Ile Ser
 35 40 45
 Leu Val Val Pro Phe Met Pro Ile Phe Val Glu Asn Leu Gly Val Gly
 50 55 60
 Ser Gln Gln Val Ala Phe Tyr Ala Gly Leu Ala Ile Ser Val Ser Ala
 65 70 75 80
 Ile Ser Ala Ala Leu Phe Ser Pro Ile Trp Gly Ile Leu Ala Asp Lys
 85 90 95
 Tyr Gly Arg Lys Pro Met Met Ile Arg Ala Gly Leu Ala Met Thr Ile

100					105					110					
Thr	Met	Gly	Gly	Leu	Ala	Phe	Val	Pro	Asn	Ile	Tyr	Trp	Leu	Ile	Phe
		115					120					125			
Leu	Arg	Leu	Leu	Asn	Gly	Val	Phe	Ala	Gly	Phe	Val	Pro	Asn	Ala	Thr
	130					135					140				
Ala	Leu	Ile	Ala	Ser	Gln	Val	Pro	Lys	Glu	Lys	Ser	Gly	Ser	Ala	Leu
	145					150					155				160
Gly	Thr	Leu	Ser	Thr	Gly	Val	Val	Ala	Gly	Thr	Leu	Thr	Gly	Pro	Phe
				165					170					175	
Ile	Gly	Gly	Phe	Ile	Ala	Glu	Leu	Phe	Gly	Ile	Arg	Thr	Val	Phe	Leu
			180					185					190		
Leu	Val	Gly	Ser	Phe	Leu	Phe	Leu	Ala	Ala	Ile	Leu	Thr	Ile	Cys	Phe
		195					200					205			
Ile	Lys	Glu	Asp	Phe	Gln	Pro	Val	Ala	Lys	Glu	Lys	Ala	Ile	Pro	Thr
	210					215					220				
Lys	Glu	Leu	Phe	Thr	Ser	Val	Lys	Tyr	Pro	Tyr	Leu	Leu	Leu	Asn	Leu
	225					230					235				240
Phe	Leu	Thr	Ser	Phe	Val	Ile	Gln	Phe	Ser	Ala	Gln	Ser	Ile	Gly	Pro
			245						250					255	
Ile	Leu	Ala	Leu	Tyr	Val	Arg	Asp	Leu	Gly	Gln	Thr	Glu	Asn	Leu	Leu
			260					265					270		
Phe	Val	Ser	Gly	Leu	Ile	Val	Ser	Ser	Met	Gly	Phe	Ser	Ser	Met	Met
		275					280					285			
Ser	Ala	Gly	Val	Met	Gly	Lys	Leu	Gly	Asp	Lys	Val	Gly	Asn	His	Arg
	290					295					300				
Leu	Leu	Val	Val	Ala	Gln	Phe	Tyr	Ser	Val	Ile	Ile	Tyr	Leu	Leu	Cys
	305					310					315				320
Ala	Asn	Ala	Ser	Ser	Pro	Leu	Gln	Leu	Gly	Leu	Tyr	Arg	Phe	Leu	Phe
			325						330					335	
Gly	Leu	Gly	Thr	Gly	Ala	Leu	Ile	Pro	Gly	Val	Asn	Ala	Leu	Leu	Ser
			340					345					350		
Lys	Met	Thr	Pro	Lys	Ala	Gly	Ile	Ser	Arg	Val	Phe	Ala	Phe	Asn	Gln
	355						360					365			
Val	Phe	Phe	Tyr	Leu	Gly	Gly	Val	Val	Gly	Pro	Met	Ala	Gly	Ser	Ala
	370					375					380				
Val	Ala	Gly	Gln	Phe	Gly	Tyr	His	Ala	Val	Phe	Tyr	Ala	Thr	Ser	Leu
	385					390					395				400
Cys	Val	Ala	Phe	Ser	Cys	Leu	Phe	Asn	Leu	Ile	Gln	Phe	Arg	Thr	Leu

405

410

415

Leu Lys Val Lys Glu Ile
420

<210> 67

<211> 1311

<212> DNA

<213> Streptococcus pneumoniae

<400> 67

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cgtatttatg caacgggtga gtggctcaat cgttctttta gcatgattga tacaggagga 180
attgatgatg tcgatgctcc tttcatggaa caaatcaagc accaggcaga aattgccatg 240
gaagaagcag atgttatcgt ttttgtcgtg tctggtaagg aaggaattac tgatgcagac 300
gaatacgtag ctgtaagct ttataagacc cacaaccag ttatcctcgc agtcaacaag 360
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<210> 68

<211> 436

<212> PRT

<213> Streptococcus pneumoniae

<400> 68

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Met Ala Leu Pro Thr Ile Ala Ile Val Gly Arg Pro Asn Val Gly Lys
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Ser Thr Leu Phe Asn Arg Ile Ala Gly Glu Arg Ile Ser Ile Val Glu
      20             25             30

Asp Val Glu Gly Val Thr Arg Asp Arg Ile Tyr Ala Thr Gly Glu Trp
      35             40             45

Leu Asn Arg Ser Phe Ser Met Ile Asp Thr Gly Gly Ile Asp Asp Val
      50             55             60

Asp Ala Pro Phe Met Glu Gln Ile Lys His Gln Ala Glu Ile Ala Met
      65             70             75             80

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Glu Glu Ala Asp Val Ile Val Phe Val Val Ser Gly Lys Glu Gly Ile
 85 90 95

Thr Asp Ala Asp Glu Tyr Val Ala Arg Lys Leu Tyr Lys Thr His Lys
 100 105 110

Pro Val Ile Leu Ala Val Asn Lys Val Asp Asn Pro Glu Met Arg Asn
 115 120 125

Asp Ile Tyr Asp Phe Tyr Ala Leu Gly Leu Gly Glu Pro Leu Pro Ile
 130 135 140

Ser Ser Val His Gly Ile Gly Thr Gly Asp Val Leu Asp Ala Ile Val
 145 150 155 160

Glu Asn Leu Pro Asn Glu Tyr Glu Glu Glu Asn Pro Asp Val Ile Lys
 165 170 175

Phe Ser Leu Ile Gly Arg Pro Asn Val Gly Lys Ser Ser Leu Ile Asn
 180 185 190

Ala Ile Leu Gly Glu Asp Arg Val Ile Ala Ser Pro Val Ala Gly Thr
 195 200 205

Thr Arg Asp Ala Ile Asp Thr His Phe Thr Asp Thr Asp Gly Gln Glu
 210 215 220

Phe Thr Met Ile Asp Thr Ala Gly Met Arg Lys Ser Gly Lys Val Tyr
 225 230 235 240

Glu Asn Thr Glu Lys Tyr Ser Val Met Arg Ala Met Arg Ala Ile Asp
 245 250 255

Arg Ser Asp Val Val Leu Met Val Ile Asn Ala Glu Glu Gly Ile Arg
 260 265 270

Glu Tyr Asp Lys Arg Ile Ala Gly Phe Ala His Glu Ala Gly Lys Gly
 275 280 285

Met Ile Ile Val Val Asn Lys Trp Asp Thr Leu Glu Lys Asp Asn His
 290 295 300

Thr Met Lys Asn Trp Glu Glu Asp Ile Arg Glu Gln Phe Gln Tyr Leu
 305 310 315 320

Pro Tyr Ala Pro Ile Ile Phe Val Ser Ala Leu Thr Lys Gln Arg Leu
 325 330 335

His Lys Leu Pro Glu Met Ile Lys Gln Ile Ser Glu Ser Gln Asn Thr
 340 345 350

Arg Ile Pro Ser Ala Val Leu Asn Asp Val Ile Met Asp Ala Ile Ala
 355 360 365

Ile Asn Pro Thr Pro Thr Asp Lys Gly Lys Arg Leu Lys Ile Phe Tyr
 370 375 380

Ala Thr Gln Val Ala Thr Lys Pro Pro Thr Phe Val Ile Phe Val Asn
 385 390 395 400

Glu Glu Glu Leu Met His Phe Ser Tyr Leu Arg Phe Leu Glu Asn Gln
 405 410 415

Ile Arg Lys Ala Phe Val Phe Glu Gly Thr Pro Ile His Leu Ile Ala
 420 425 430

Arg Lys Arg Lys
 435

<210> 69

<211> 714

<212> DNA

<213> Streptococcus pneumoniae

<400> 69

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<210> 70

<211> 237

<212> PRT

<213> Streptococcus pneumoniae

<400> 70

Met Thr Glu Thr Ile Lys Leu Met Lys Ala His Thr Ser Val Arg Arg
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Phe Lys Glu Gln Glu Ile Pro Gln Val Asp Leu Asn Glu Ile Leu Thr
 20 25 30

Ala Ala Gln Met Ala Ser Ser Trp Lys Asn Phe Gln Ser Tyr Ser Val
 35 40 45

Ile Val Val Arg Ser Gln Glu Lys Lys Asp Ala Leu Tyr Glu Leu Val
 50 55 60

Pro Gln Glu Ala Ile Arg Gln Ser Ala Val Phe Leu Leu Phe Val Gly
 65 70 75 80

Asp Leu Asn Arg Ala Glu Lys Gly Ala Arg Leu His Thr Asp Thr Phe

85	90	95
Gln Pro Gln Gly Val Glu Gly Leu Leu Ile Ser Ser Val Asp Ala Ala		
100	105	110
Leu Ala Gly Gln Asn Ala Leu Leu Ala Ala Glu Ser Leu Gly Tyr Gly		
115	120	125
Gly Val Ile Ile Gly Leu Val Arg Tyr Lys Ser Glu Glu Val Ala Glu		
130	135	140
Leu Phe Asn Leu Pro Asp Tyr Thr Tyr Ser Val Phe Gly Met Ala Leu		
145	150	155
Gly Val Pro Asn Gln His His Asp Met Lys Pro Arg Leu Pro Leu Glu		
165	170	175
Asn Val Val Phe Glu Glu Glu Tyr Gln Glu Gln Ser Thr Glu Ala Ile		
180	185	190
Gln Ala Tyr Asp Arg Val Gln Ala Asp Tyr Ala Gly Ala Arg Ala Thr		
195	200	205
Thr Ser Trp Ser Gln Arg Leu Ala Glu Gln Phe Gly Gln Ala Glu Pro		
210	215	220
Ser Ser Thr Arg Lys Asn Leu Glu Gln Lys Lys Leu Leu		
225	230	235

<210> 71
 <211> 729
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 71
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 cggacctacc tttttgggca caagctcttt ctcttagatg aggccttttag cgccttggat 480
 gagatgacaa agatggaact ccacgcttgg tatcttgaga ttcacaagca gttgcagcta 540
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 atcttgaaaa atcgccctgg gcagattgtt tcagaaatta aactagattg gtctgaagat 660
 gaggacaagg aagtccaaaa gattgcctac aaacgtcaaa ttttggcgga attaggctta 720
 gataagtag 729

<210> 72
 <211> 242
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 72

Met Thr Glu Ile Arg Leu Glu His Val Ser Tyr Ala Tyr Gly Gln Glu
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Arg Ile Leu Glu Asp Ile Asn Leu Gln Val Thr Ser Gly Glu Val Val
20 25 30

Ser Ile Leu Gly Pro Ser Gly Val Gly Lys Thr Thr Leu Phe Asn Leu
35 40 45

Ile Ala Gly Ile Leu Glu Val Gln Ser Gly Arg Ile Val Leu Asp Gly
50 55 60

Glu Glu Asn Pro Lys Gly Arg Val Ser Tyr Met Leu Gln Lys Asp Leu
65 70 75 80

Leu Leu Glu His Lys Thr Val Leu Gly Asn Ile Ile Leu Pro Leu Leu
85 90 95

Ile Gln Lys Val Asp Lys Ala Glu Ala Ile Ser Arg Ala Asp Lys Ile
100 105 110

Leu Ala Thr Phe Gln Leu Thr Ala Val Arg Asp Lys Tyr Pro His Glu
115 120 125

Leu Ser Gly Gly Met Arg Gln Arg Val Ala Leu Leu Arg Thr Tyr Leu
130 135 140

Phe Gly His Lys Leu Phe Leu Leu Asp Glu Ala Phe Ser Ala Leu Asp
145 150 155 160

Glu Met Thr Lys Met Glu Leu His Ala Trp Tyr Leu Glu Ile His Lys
165 170 175

Gln Leu Gln Leu Thr Thr Leu Ile Ile Thr His Ser Ile Glu Glu Ala
180 185 190

Leu Asn Leu Ser Asp Arg Ile Tyr Ile Leu Lys Asn Arg Pro Gly Gln
195 200 205

Ile Val Ser Glu Ile Lys Leu Asp Trp Ser Glu Asp Glu Asp Lys Glu
210 215 220

Val Gln Lys Ile Ala Tyr Lys Arg Gln Ile Leu Ala Glu Leu Gly Leu
225 230 235 240

Asp Lys

<210> 73

<211> 2433

<212> DNA

<213> Streptococcus pneumoniae

<400> 73

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<210> 74

<211> 810

<212> PRT

<213> Streptococcus pneumoniae

<400> 74

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Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu
      20                      25                      30

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Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn
    35                      40                      45

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Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu
 50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe
 65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser
 85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile
 100 105 110

Leu His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly
 115 120 125

Phe Ser Tyr Glu Asp Lys Lys Asp Gln Val Lys Ile Ala Ala Leu Arg
 130 135 140

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala
 145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala
 165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr
 180 185 190

Thr His Asp Leu Thr Glu Gln Ala Arg Ser Gly Lys Leu Glu Pro Val
 195 200 205

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg
 210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys
 225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val
 245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn
 260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn
 275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile
 290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr
 305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu
 325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu
 340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu
 355 360 365
 Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr
 370 375 380
 Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr
 385 390 395 400
 Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp
 405 410 415
 Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys
 420 425 430
 Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys
 435 440 445
 Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys
 450 455 460
 Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile
 465 470 475 480
 Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr
 485 490 495
 Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys
 500 505 510
 Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile
 515 520 525
 Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser
 530 535 540
 Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys
 545 550 555 560
 Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe
 565 570 575
 Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly
 580 585 590
 Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu
 595 600 605
 Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu
 610 615 620
 Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp
 625 630 635 640
 Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr
 645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp
 660 665 670
 Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn
 675 680 685
 Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu
 690 695 700
 Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser
 705 710 715 720
 Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala
 725 730 735
 Ser Leu Thr Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu
 740 745 750
 Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro
 755 760 765
 Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu
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 Leu Leu Lys Gly Asp Leu Val Ala Gly Ser Thr Leu Lys Ile Gly Val
 785 790 795 800
 Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala
 805 810

<210> 75
 <211> 1008
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 75
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 gactttatcc tagactggac accaaatacc aaccacacag ggctttatgt tgccaaggaa 180
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<210> 76

<211> 335

<212> PRT

<213> Streptococcus pneumoniae

<400> 76

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20 25 30

Lys Glu Ala Glu Leu Lys Lys Val Asp Phe Ile Leu Asp Trp Thr Pro
35 40 45

Asn Thr Asn His Thr Gly Leu Tyr Val Ala Lys Glu Lys Gly Tyr Phe
50 55 60

Lys Glu Ala Gly Val Asp Val Asp Leu Lys Leu Pro Pro Glu Glu Ser
65 70 75 80

Ser Ser Asp Leu Val Ile Asn Gly Lys Ala Pro Phe Ala Val Tyr Phe
85 90 95

Gln Asp Tyr Met Ala Lys Lys Leu Glu Lys Gly Ala Gly Ile Thr Ala
100 105 110

Val Ala Ala Ile Val Glu His Asn Thr Ser Gly Ile Ile Ser Arg Lys
115 120 125

Ser Asp Asn Val Ser Ser Pro Lys Asp Leu Val Gly Lys Lys Tyr Gly
130 135 140

Thr Trp Asn Asp Pro Thr Glu Leu Ala Met Leu Lys Thr Leu Val Glu
145 150 155 160

Ser Gln Gly Gly Asp Phe Glu Lys Val Glu Lys Val Pro Asn Asn Asp
165 170 175

Ser Asn Ser Ile Thr Pro Ile Ala Asn Gly Val Phe Asp Thr Ala Trp
180 185 190

Ile Tyr Tyr Gly Trp Asp Gly Ile Leu Ala Lys Ser Gln Gly Val Asp
195 200 205

Ala Asn Phe Met Tyr Leu Lys Asp Tyr Val Lys Glu Phe Asp Tyr Tyr
210 215 220

Ser Pro Val Ile Ile Ala Asn Asn Asp Tyr Leu Lys Asp Asn Lys Glu
225 230 235 240

Glu Ala Arg Lys Val Ile Gln Ala Ile Lys Lys Gly Tyr Gln Tyr Ala
245 250 255

Met Glu His Pro Glu Glu Ala Ala Asp Ile Leu Ile Lys Asn Ala Pro
260 265 270

Glu Leu Lys Glu Lys Arg Asp Phe Val Ile Glu Ser Gln Lys Tyr Leu
 275 280 285

Ser Lys Glu Tyr Ala Ser Asp Lys Glu Lys Trp Gly Gln Phe Asp Ala
 290 295 300

Ala Arg Trp Asn Ala Phe Tyr Lys Trp Asp Lys Glu Asn Gly Ile Leu
 305 310 315 320

Lys Glu Asp Leu Thr Asp Lys Gly Phe Thr Asn Glu Phe Val Lys
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<210> 77

<211> 762

<212> DNA

<213> Streptococcus pneumoniae

<400> 77

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 ggaggttttg aaggtccttg tgtttatatg attcagtcta aaaaactgtt tcagtatgat 660
 accatgtttg ccattattat tctgggtgtc attatcagtc ttttgggtat gaagctggtc 720
 gatatcagtg aaaaatatgt gattaaatgg aaacgttcgt ag 762

<210> 78

<211> 253

<212> PRT

<213> Streptococcus pneumoniae

<400> 78

Met Met Arg Asn Leu Arg Ser Ile Leu Arg Arg His Ile Ser Leu Leu
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Leu Leu Pro Lys Phe Ile Leu Pro Thr Pro Leu Glu Ile Leu Gln Pro
 35 40 45

Phe Val Arg Asp Arg Glu Phe Leu Trp His His Ser Trp Ala Thr Leu
 50 55 60

Arg Val Ala Leu Leu Gly Leu Ile Leu Gly Val Leu Ile Ala Cys Leu
 65 70 75 80

Met Ala Val Leu Met Asp Ser Leu Thr Trp Leu Asn Asp Leu Ile Tyr
85 90 95

Pro Met Met Val Val Ile Gln Thr Ile Pro Thr Ile Ala Ile Ala Pro
100 105 110

Ile Leu Val Leu Trp Leu Gly Tyr Gly Ile Leu Pro Lys Ile Val Leu
115 120 125

Ile Ile Leu Thr Thr Thr Phe Pro Ile Ile Val Ser Ile Leu Asp Gly
130 135 140

Phe Arg His Cys Asp Lys Asp Met Leu Thr Leu Phe Ser Leu Met Arg
145 150 155 160

Ala Lys Pro Trp Gln Ile Leu Trp His Phe Lys Ile Pro Val Ser Leu
165 170 175

Pro Tyr Phe Tyr Ala Gly Leu Arg Val Ser Val Ser Tyr Ala Phe Ile
180 185 190

Thr Thr Val Val Ser Glu Trp Leu Gly Gly Phe Glu Gly Leu Gly Val
195 200 205

Tyr Met Ile Gln Ser Lys Lys Leu Phe Gln Tyr Asp Thr Met Phe Ala
210 215 220

Ile Ile Ile Leu Val Ser Ile Ile Ser Leu Leu Gly Met Lys Leu Val
225 230 235 240

Asp Ile Ser Glu Lys Tyr Val Ile Lys Trp Lys Arg Ser
245 250

<210> 79
<211> 372
<212> DNA
<213> Streptococcus pneumoniae

<400> 79
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atcattgact ctttttggtat tatcatcgac catttcttaa aaaatgtctt tgaattggaa 180
gaagaactcg agtttcaatt gcttaataac caaggaaaga ttaccttcca cttttcaagt 240
caacacctcc ctacagccat tgattttgac tttaaccatc ctttcgaccc tcgttatccc 300
ccaagagtac tggttttaga catggacggt agagaaacta tcctcctccc agaagaaaat 360
gacctatttt aa 372

<210> 80
<211> 123
<212> PRT
<213> Streptococcus pneumoniae

<400> 80
Met Ile Phe Asn Pro Ile Cys Cys Met Ile Arg Glu Lys Lys Gly Asp

1	5	10	15
Arg Asp Met	Ala Phe Thr Asn Thr	His Met Arg Ser Ala Ser	Phe Gly
20	25	30	
Ile Val Thr	Ser Leu Pro Asp Asp	Ile Ile Asp Ser Phe Trp	Tyr Ile
35	40	45	
Ile Asp His	Phe Leu Lys Asn Val	Phe Glu Leu Glu Glu	Glu Leu Glu
50	55	60	
Phe Gln Leu	Leu Asn Asn Gln Gly	Lys Ile Thr Phe His	Phe Ser Ser
65	70	75	80
Gln His Leu	Pro Thr Ala Ile Asp	Phe Asp Phe Asn His	Pro Phe Asp
85	90	95	
Pro Arg Tyr	Pro Pro Arg Val Leu	Val Leu Asp Met Asp	Gly Arg Glu
100	105	110	
Thr Ile Leu	Leu Pro Glu Glu Asn	Asp Leu Phe	
115	120		

<210> 81

<211> 1645

<212> DNA

<213> Streptococcus pneumoniae

<400> 81

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tggtactatt cgttccaatt cacaattaga caacagaaca gttgaatcta cagtaacatc 420
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tgatcgacaa gcaattcaag atgcaataga tgctgcagct caagggctag gtggaggaaa 600
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tgcaaaagat agtgcagaat gtttaggaaa agtatcagat attactgtaa caaaaaatgt 1560

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<210> 82

<211> 548

<212> PRT

<213> Streptococcus pneumoniae

<400> 82

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 1 5 10 15

Lys Ile Val Lys Lys Leu Glu Val Leu Met Lys Tyr Phe Val Pro Asn
 20 25 30

Glu Val Phe Ser Ile Arg Lys Leu Lys Val Gly Thr Cys Ser Val Leu
 35 40 45

Leu Ala Ile Ser Ile Leu Gly Ser Gln Gly Ile Leu Ser Asp Glu Val
 50 55 60

Val Thr Ser Ser Ser Pro Met Ala Thr Lys Glu Ser Ser Asn Ala Ile
 65 70 75 80

Thr Asn Asp Leu Asp Asn Ser Pro Thr Val Asn Gln Asn Arg Ser Ala
 85 90 95

Glu Met Ile Ala Ser Asn Ser Thr Thr Asn Gly Leu Asp Asn Ser Leu
 100 105 110

Ser Val Asn Ser Ile Ser Ser Asn Gly Thr Ile Arg Ser Asn Ser Gln
 115 120 125

Leu Asp Asn Arg Thr Val Glu Ser Thr Val Thr Ser Thr Asn Glu Asn
 130 135 140

Lys Ser Tyr Lys Glu Asp Val Ile Ser Asp Arg Ile Ile Lys Lys Glu
 145 150 155 160

Phe Glu Asp Thr Ala Leu Ser Val Lys Asp Tyr Gly Ala Val Gly Asp
 165 170 175

Gly Ile His Asp Asp Arg Gln Ala Ile Gln Asp Ala Ile Asp Ala Ala
 180 185 190

Ala Gln Gly Leu Gly Gly Gly Asn Val Tyr Phe Pro Glu Gly Thr Tyr
 195 200 205

Leu Val Lys Glu Ile Val Phe Leu Lys Ser His Thr His Leu Glu Leu
 210 215 220

Asn Glu Lys Ala Thr Ile Leu Asn Gly Ile Asn Ile Lys Asn His Pro
 225 230 235 240

Ser Ile Val Phe Met Thr Gly Leu Phe Thr Asp Asp Gly Ala Gln Val
 245 250 255

Glu Trp Gly Pro Thr Glu Asp Ile Ser Tyr Ser Gly Gly Thr Ile Asp
 260 265 270
 Met Asn Gly Ala Leu Asn Glu Glu Gly Thr Lys Ala Lys Asn Leu Pro
 275 280 285
 Leu Ile Asn Ser Ser Gly Ala Phe Ala Ile Gly Asn Ser Asn Asn Val
 290 295 300
 Thr Ile Lys Asn Val Thr Phe Lys Asp Ser Tyr Gln Gly His Ala Ile
 305 310 315 320
 Gln Ile Ala Gly Ser Lys Asn Val Leu Val Asp Asn Ser Arg Phe Leu
 325 330 335
 Gly Gln Ala Leu Pro Lys Thr Met Lys Asp Gly Gln Ile Ile Ser Lys
 340 345 350
 Glu Ser Ile Gln Ile Glu Pro Leu Thr Arg Lys Gly Phe Pro Tyr Ala
 355 360 365
 Leu Asn Asp Asp Gly Lys Lys Ser Glu Asn Val Thr Ile Gln Asn Ser
 370 375 380
 Tyr Phe Gly Lys Ser Asp Lys Ser Gly Glu Leu Val Thr Ala Ile Gly
 385 390 395 400
 Thr His Tyr Gln Thr Leu Ser Thr Gln Asn Pro Ser Asn Ile Lys Ile
 405 410 415
 Gln Asn Asn His Phe Asp Asn Met Met Tyr Ala Gly Val Arg Phe Thr
 420 425 430
 Gly Phe Thr Asp Val Leu Ile Lys Gly Asn Arg Phe Asp Lys Lys Val
 435 440 445
 Lys Gly Glu Ser Val His Tyr Arg Glu Ser Gly Ala Ala Leu Val Asn
 450 455 460
 Ala Tyr Ser Tyr Lys Asn Thr Lys Asp Leu Leu Asp Leu Asn Lys Gln
 465 470 475 480
 Val Val Ile Ala Glu Asn Ile Phe Asn Ile Ala Asp Pro Lys Thr Lys
 485 490 495
 Ala Ile Arg Val Ala Lys Asp Ser Ala Glu Cys Leu Gly Lys Val Ser
 500 505 510
 Asp Ile Thr Val Thr Lys Asn Val Ile Asn Asn Asn Ser Lys Glu Thr
 515 520 525
 Glu Gln Pro Asn Ile Glu Leu Leu Arg Val Ser Asp Asn Leu Val Val
 530 535 540
 Ser Glu Asn Ser
 545

<210> 83
 <211> 324
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 83
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 actatcggtc caggaactat ttatcctttg ttgcaaaagt tagaaaaaaa tcaatggata 180
 agaggcgaca tgcgcccgtc gccagatggg ccagatcgga agtatttttc attaataaaa 240
 gaaggagaag agcgtgtctc agtcttttgg caacaatggg acgatttgag tcaaaaagta 300
 gaagggatta agaatggggg ttaa 324

<210> 84
 <211> 107
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 84
 Met Met Lys Glu Thr Gln Leu Leu Lys Gly Val Leu Glu Gly Cys Val
 1 5 10 15
 Leu Asp Met Ile Gly Gln Lys Glu Arg Tyr Gly Tyr Glu Leu Val Gln
 20 25 30
 Thr Leu Arg Glu Ala Gly Phe Asp Thr Ile Val Pro Gly Thr Ile Tyr
 35 40 45
 Pro Leu Leu Gln Lys Leu Glu Lys Asn Gln Trp Ile Arg Gly Asp Met
 50 55 60
 Arg Pro Ser Pro Asp Gly Pro Asp Arg Lys Tyr Phe Ser Leu Met Lys
 65 70 75 80
 Glu Gly Glu Glu Arg Val Ser Val Phe Trp Gln Gln Trp Asp Asp Leu
 85 90 95
 Ser Gln Lys Val Glu Gly Ile Lys Asn Gly Gly
 100 105

<210> 85
 <211> 816
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 85
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gcggtattac gttattatca actactaagt gatttttcta aaggtcctct cttaacagtc 360
 aatttgctca catttttagg gcaacttctt atttttctga ttggatttgg acttgtggcc 420
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 ctagttatcg gtatttggaa ttggaaagaa gcggtctttc gtccatttgt cagtatgatt 660
 attgcccatac ttgtggtggg ttctctgctc cgttattatg agtggatggg aatttcaaat 720
 gttttcctta caaaagttat tccttttagct gtcctcttta ttggaatcct tgtcttgctc 780
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<210> 86

<211> 271

<212> PRT

<213> Streptococcus pneumoniae

<400> 86

Met Lys Lys Met Lys Tyr Tyr Glu Glu Thr Ser Ala Leu Leu His Glu
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 20 25 30

Asn Leu Ala Gly Phe Leu Tyr Asp Glu Asp Tyr Leu Arg Glu Gln Ile
 35 40 45

Tyr Leu Met Met Leu Asp Phe Ser Glu Ala Glu Arg Asp Gly Met Ser
 50 55 60

Ala Glu Asp Tyr Leu Gly Lys Asn Pro Lys Lys Ile Met Lys Glu Ile
 65 70 75 80

Leu Lys Gly Ala Pro Arg Ser Ser Ile Lys Glu Ser Leu Leu Thr Pro
 85 90 95

Ile Leu Val Leu Ala Val Leu Arg Tyr Tyr Gln Leu Leu Ser Asp Phe
 100 105 110

Ser Lys Gly Pro Leu Leu Thr Val Asn Leu Leu Thr Phe Leu Gly Gln
 115 120 125

Leu Leu Ile Phe Leu Ile Gly Phe Gly Leu Val Ala Thr Ile Leu Arg
 130 135 140

Arg Ser Leu Val Gln Asp Ser Pro Lys Met Lys Ile Gly Thr Tyr Ile
 145 150 155 160

Val Val Gly Thr Ile Val Leu Leu Val Val Leu Gly Tyr Val Gly Met
 165 170 175

Ala Ser Phe Ile Gln Glu Gly Ala Phe Tyr Ile Pro Ala Pro Trp Asp
 180 185 190

Ser Leu Ser Val Phe Thr Ile Ser Leu Val Ile Gly Ile Trp Asn Trp
 195 200 205

Lys Glu Ala Val Phe Arg Pro Phe Val Ser Met Ile Ile Ala His Leu

210	215	220
Val Val Gly Ser Leu Leu Arg Tyr Tyr Glu Trp Met Gly Ile Ser Asn		
225	230	235 240
Val Phe Leu Thr Lys Val Ile Pro Leu Ala Val Leu Phe Ile Gly Ile		
245	250	255
Phe Val Leu Phe Arg Gly Phe Lys Lys Ile Lys Trp Ser Glu Val		
260	265	270

<210> 87
 <211> 348
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 87
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 tttgagggtg tagatgaaac tgacgaagtc agctcaaaac actgttttga ggttgtagat 180
 gaaactgacg aagtcagctc aaaacactgt tttgagggtg tagatgaaac tgacgaagtc 240
 agctcaaaac atgtttttga ggttgtagat gaaactgacg aagtcagtaa ccatacatat 300
 ggtagggcga cgctgacgtg gtttgaagag attttcgaag agtattaa 348

<210> 88
 <211> 115
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 88
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 Asp Glu Val Ser Ser Lys His Val Phe Glu Val Val Asp Glu Thr Asp
 35 40 45
 Glu Val Ser Ser Lys His Cys Phe Glu Val Val Asp Glu Thr Asp Glu
 50 55 60
 Val Ser Ser Lys His Cys Phe Glu Val Val Asp Glu Thr Asp Glu Val
 65 70 75 80
 Ser Ser Lys His Val Phe Glu Val Val Asp Glu Thr Asp Glu Val Ser
 85 90 95
 Asn His Thr Tyr Gly Arg Ala Thr Leu Thr Trp Phe Glu Glu Ile Phe
 100 105 110
 Glu Glu Tyr
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<210> 89
 <211> 1260
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 89
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 tctggaaagg aagaggaagt tcctgttgaa ccgcaaaaac cgcaagaatc ctgggtccaa 300
 gaggcagcta aactgaaggg agtggatagt tactatgtaa ccaattcaac gaatgccatc 360
 ttgacctatc aagataaaaa ggttgagaat gctaatttga caggtggaaa cagaacttac 420
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 gagtttgcaa gtgtcatttt gctagatgag gaattgtcca ttagtttatt tgaatctcct 540
 caagaggcta ttaacaaggc tgtagaagtc aatggattta gttaccgggt cattgggggt 600
 tatactagtc cggaggctaa aagatcaaaa atatatgggt ttggtggctt gcctattact 660
 accaatatct cccttgctgc gaattttaat gtagatgaaa tagctaatat tgtctttcga 720
 gtgaatgata ccagtttaac cccaactctg ggtccagaac tggcacgaaa aatgacagag 780
 cttgcaggct tacaacaggc agaataccag gtggcagatg agtcggttg atttgcagaa 840
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 tcaatcccag tcgccctatt tagtcttgca gtttcggcta gtgttggtat gatttttgga 1200
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<210> 90
 <211> 419
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 90
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 20 25 30
 Val Val Ile Met Ala Leu Gly Asp Ser Leu Ser Arg Gln Val Asn Lys
 35 40 45
 Asp Met Thr Lys Ser Gln Lys Asn Ile Ser Val Phe Phe Ser Pro Lys
 50 55 60
 Lys Ser Lys Asp Gly Ser Phe Thr Gln Lys Gln Ser Ala Phe Thr Val
 65 70 75 80
 Ser Gly Lys Glu Glu Glu Val Pro Val Glu Pro Pro Lys Pro Gln Glu
 85 90 95
 Ser Trp Val Gln Glu Ala Ala Lys Leu Lys Gly Val Asp Ser Tyr Tyr
 100 105 110

Val Thr Asn Ser Thr Asn Ala Ile Leu Thr Tyr Gln Asp Lys Lys Val
 115 120 125
 Glu Asn Ala Asn Leu Thr Gly Gly Asn Arg Thr Tyr Met Asp Ala Val
 130 135 140
 Lys Asn Glu Ile Ile Ala Gly Arg Ser Leu Arg Glu Gln Asp Phe Lys
 145 150 155 160
 Glu Phe Ala Ser Val Ile Leu Leu Asp Glu Glu Leu Ser Ile Ser Leu
 165 170 175
 Phe Glu Ser Pro Gln Glu Ala Ile Asn Lys Val Val Glu Val Asn Gly
 180 185 190
 Phe Ser Tyr Arg Val Ile Gly Val Tyr Thr Ser Pro Glu Ala Lys Arg
 195 200 205
 Ser Lys Ile Tyr Gly Phe Gly Gly Leu Pro Ile Thr Thr Asn Ile Ser
 210 215 220
 Leu Ala Ala Asn Phe Asn Val Asp Glu Ile Ala Asn Ile Val Phe Arg
 225 230 235 240
 Val Asn Asp Thr Ser Leu Thr Pro Thr Leu Gly Pro Glu Leu Ala Arg
 245 250 255
 Lys Met Thr Glu Leu Ala Gly Leu Gln Gln Gly Glu Tyr Gln Val Ala
 260 265 270
 Asp Glu Ser Val Val Phe Ala Glu Ile Gln Gln Ser Phe Ser Phe Met
 275 280 285
 Thr Thr Ile Ile Ser Ser Ile Ala Gly Ile Ser Leu Phe Val Gly Gly
 290 295 300
 Thr Gly Val Met Asn Ile Met Leu Val Ser Val Thr Glu Arg Thr Arg
 305 310 315 320
 Glu Ile Gly Leu Arg Lys Ala Leu Gly Ala Thr Arg Ala Asn Ile Leu
 325 330 335
 Ile Gln Phe Leu Ile Glu Ser Met Ile Leu Thr Leu Leu Gly Gly Leu
 340 345 350
 Ile Gly Leu Thr Ile Ala Ser Gly Leu Thr Ala Leu Ala Gly Leu Leu
 355 360 365
 Leu Gln Gly Leu Ile Glu Gly Ile Glu Val Gly Val Ser Ile Pro Val
 370 375 380
 Ala Leu Phe Ser Leu Ala Val Ser Ala Ser Val Gly Met Ile Phe Gly
 385 390 395 400
 Val Leu Pro Ala Asn Lys Ala Ser Lys Leu Asp Pro Ile Glu Ala Leu
 405 410 415

Arg Tyr Glu

<210> 91
<211> 705
<212> DNA
<213> Streptococcus pneumoniae

<400> 91
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atgggaccat ctgggtctgg taagtccact ctgatgaata cgattggcat gttggataca 180
ccaaccagtg gagaatatta tcttgaaggc caagaagtgg ctgggcttgg tgaaaaacaa 240
ctagctaagg tccgtaacca acaaatecgg tttgtctttc agcagttctt tcttctatcg 300
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gtaaacaatc cttctattat cctagcggat gaaccgacag gagccttgga taccaaaaca 540
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<210> 92
<211> 234
<212> PRT
<213> Streptococcus pneumoniae

<400> 92
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20 25 30
Asn Glu Gly Glu Phe Val Ala Ile Met Gly Pro Ser Gly Ser Gly Lys
35 40 45
Ser Thr Leu Met Asn Thr Ile Gly Met Leu Asp Thr Pro Thr Ser Gly
50 55 60
Glu Tyr Tyr Leu Glu Gly Gln Glu Val Ala Gly Leu Gly Glu Lys Gln
65 70 75 80
Leu Ala Lys Val Arg Asn Gln Gln Ile Gly Phe Val Phe Gln Gln Phe
85 90 95
Phe Leu Leu Ser Lys Leu Asn Ala Leu Gln Asn Val Glu Leu Pro Leu
100 105 110
Ile Tyr Ala Gly Val Ser Ser Ser Lys Arg Arg Lys Leu Ala Glu Glu
115 120 125
Tyr Leu Asp Lys Val Glu Leu Thr Glu Arg Ser His His Leu Pro Ser

130	135	140
Glu Leu Ser Gly Gly Gln Lys Gln Arg Val Ala Ile Ala Arg Ala Leu		
145	150	155 160
Val Asn Asn Pro Ser Ile Ile Leu Ala Asp Glu Pro Thr Gly Ala Leu		
	165	170 175
Asp Thr Lys Thr Gly Asn Gln Ile Met Gln Leu Leu Val Asp Leu Asn		
	180	185 190
Lys Glu Gly Lys Thr Ile Ile Met Val Thr His Glu Pro Glu Ile Ala		
	195	200 205
Ala Tyr Ala Lys Arg Gln Ile Val Ile Arg Asp Gly Val Ile Ser Ser		
	210	215 220
Asp Ser Ala Gln Leu Gly Lys Glu Glu Asn		
225	230	

<210> 93
 <211> 1200
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 93
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 ctaaaagatg agcctactca tcttggttgtt gccaaaggaag gaagcgtggc ctctctgtgt 180
 ttattgtcag ggacagtaac agcaaaaaat gaacaatatg tttattttga tgctagtaag 240
 ggtgatttag atgaaatcct tgtttctgtg ggcgataagg tcagcgaagg gcaggcttta 300
 gtcaagtaca gtagttcaga agcgcaggcg gcctatgatt cagctagtcg agcagtagct 360
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 gctccacagt taccagcgcc agtaggagga gaagatgcaa cggtgcaaag cccaactcca 480
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 gcgagtcaag ttatggttca tattgtcagc aatgaaaatt tacaagtcaa gggagaattg 720
 tctgagtaca atctagccaa cctttctgta ggtcaagaag taagctttac ttctaaagtg 780
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 aatccaacat cttccttggg agaaggaaaa gaggtgaagg ctgatgaagc aactaattag 1200

<210> 94
 <211> 399
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 94
 Met Lys Lys Lys Asn Gly Lys Ala Lys Lys Trp Gln Leu Tyr Ala Ala

1	5	10	15
Ile Gly Ala	Ala Ser Val	Val Val Leu	Gly Ala Gly Gly Ile Leu Leu
	20	25	30
Phe Arg Gln	Pro Ser Gln	Thr Ala Leu	Lys Asp Glu Pro Thr His Leu
	35	40	45
Val Val Ala	Lys Glu Gly	Ser Val Ala	Ser Ser Val Leu Leu Ser Gly
	50	55	60
Thr Val Thr	Ala Lys Asn	Glu Gln Tyr	Val Tyr Phe Asp Ala Ser Lys
	65	70	75
Gly Asp Leu	Asp Glu Ile	Leu Val Ser	Val Gly Asp Lys Val Ser Glu
	85	90	95
Gly Gln Ala	Leu Val Lys	Tyr Ser Ser	Ser Glu Ala Gln Ala Ala Tyr
	100	105	110
Asp Ser Ala	Ser Arg Ala	Val Ala Arg	Ala Asp Arg His Ile Asn Glu
	115	120	125
Leu Asn Gln	Ala Arg Asn	Glu Ala Ala	Ser Ala Pro Ala Pro Gln Leu
	130	135	140
Pro Ala Pro	Val Gly Gly	Glu Asp Ala	Thr Val Gln Ser Pro Thr Pro
	145	150	155
Val Ala Gly	Asn Ser Val	Ala Ser Ile	Asp Ala Gln Leu Gly Asp Ala
	165	170	175
Arg Asp Ala	Arg Ala Asp	Ala Ala Ala	Gln Leu Ser Lys Ala Gln Ser
	180	185	190
Gln Leu Asp	Ala Thr Thr	Val Leu Ser	Thr Leu Glu Gly Thr Val Val
	195	200	205
Glu Val Asn	Ser Asn Val	Ser Lys Ser	Pro Thr Gly Ala Ser Gln Val
	210	215	220
Met Val His	Ile Val Ser	Asn Glu Asn	Leu Gln Val Lys Gly Glu Leu
	225	230	235
Ser Glu Tyr	Asn Leu Ala	Asn Leu Ser	Val Gly Gln Glu Val Ser Phe
	245	250	255
Thr Ser Lys	Val Tyr Pro	Asp Lys Lys	Trp Thr Gly Lys Leu Ser Tyr
	260	265	270
Ile Ser Asp	Tyr Pro Lys	Asn Asn Gly	Glu Ala Ala Ser Pro Ala Ala
	275	280	285
Gly Asn Asn	Thr Gly Ser	Lys Tyr Pro	Tyr Thr Ile Asp Val Thr Gly
	290	295	300
Glu Val Gly	Asp Leu Lys	Gln Gly Phe	Ser Val Asn Ile Glu Val Lys

305 310 315 320
 Ser Lys Thr Lys Ala Ile Leu Val Pro Val Ser Ser Leu Val Met Asp
 325 330 335
 Asp Ser Lys Asn Tyr Val Trp Ile Val Asp Glu Gln Gln Lys Ala Lys
 340 345 350
 Lys Val Glu Val Ser Leu Gly Asn Ala Asp Ala Glu Asn Gln Glu Ile
 355 360 365
 Thr Ser Gly Leu Thr Asn Gly Ala Lys Val Ile Ser Asn Pro Thr Ser
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 Ser Leu Glu Glu Gly Lys Glu Val Lys Ala Asp Glu Ala Thr Asn
 385 390 395

<210> 95
 <211> 759
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 95
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 atcgctgctc cagctcttga ttgacaact gttcttgctg ttgcaaaagg ctcaaactt 180
 aaagttgctg ctcaaaactg ctactttgaa aatgcagggt ctttcactgg tgaaactagc 240
 ccacaagttt tgaagaaat cggtactgac tacgttggtt tcggtcactc agaacgccgt 300
 gactacttcc atgaaactga tgaagatac aacaaaaaag caaaagcaat ctttgccaac 360
 ggtatgcttc caatcatctg ttgtgggtgaa tcacttgaaa cttacgaagc tggtaaagct 420
 gctgaattcg taggtgctca agtatctgct gcattggctg gattgactgc tgaacaagtt 480
 gctgcctcag ttatcgctta tgagccaatc tgggctatcg gtactggtaa atcagcttca 540
 caagacgatg cacaaaaaat gtgtaaagtt gttcgtgacg ttgtagctgc tgactttggt 600
 caagaagtcg cagacaaagt tcgtgttcaa tacggtgggt ctgttaaacc tgaaaatggt 660
 gcttcataca tggcttgccc agacgttgac ggtgcccttg taggtgggtgc gtcacttgaa 720
 gctgaaagct tcttggtttt gcttgacttt gtaaaaataa 759

<210> 96
 <211> 252
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 96
 Met Ser Arg Lys Pro Phe Ile Ala Gly Asn Trp Lys Met Asn Lys Asn
 1 5 10 15
 Pro Glu Glu Ala Lys Ala Phe Val Glu Ala Val Ala Ser Lys Leu Pro
 20 25 30
 Ser Ser Asp Leu Val Glu Ala Gly Ile Ala Ala Pro Ala Leu Asp Leu
 35 40 45
 Thr Thr Val Leu Ala Val Ala Lys Gly Ser Asn Leu Lys Val Ala Ala
 50 55 60

Gln Asn Cys Tyr Phe Glu Asn Ala Gly Ala Phe Thr Gly Glu Thr Ser
65 70 75 80

Pro Gln Val Leu Lys Glu Ile Gly Thr Asp Tyr Val Val Ile Gly His
85 90 95

Ser Glu Arg Arg Asp Tyr Phe His Glu Thr Asp Glu Asp Ile Asn Lys
100 105 110

Lys Ala Lys Ala Ile Phe Ala Asn Gly Met Leu Pro Ile Ile Cys Cys
115 120 125

Gly Glu Ser Leu Glu Thr Tyr Glu Ala Gly Lys Ala Ala Glu Phe Val
130 135 140

Gly Ala Gln Val Ser Ala Ala Leu Ala Gly Leu Thr Ala Glu Gln Val
145 150 155 160

Ala Ala Ser Val Ile Ala Tyr Glu Pro Ile Trp Ala Ile Gly Thr Gly
165 170 175

Lys Ser Ala Ser Gln Asp Asp Ala Gln Lys Met Cys Lys Val Val Arg
180 185 190

Asp Val Val Ala Ala Asp Phe Gly Gln Glu Val Ala Asp Lys Val Arg
195 200 205

Val Gln Tyr Gly Gly Ser Val Lys Pro Glu Asn Val Ala Ser Tyr Met
210 215 220

Ala Cys Pro Asp Val Asp Gly Ala Leu Val Gly Gly Ala Ser Leu Glu
225 230 235 240

Ala Glu Ser Phe Leu Ala Leu Asp Phe Val Lys
245 250

<210> 97

<211> 1473

<212> DNA

<213> Streptococcus pneumoniae

<400> 97

ttgaaaacaa aaattggatt agcaagtatc tgtttactag gcttggcaac tagtcatgtc 60
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tcagagcaaa atcagtcctc taataaaacg caaacgagcg cagaagtaca gactaatgct 180
gctgcccact gggatgggga ttattatgta aaggatgatg gttctaaagc tcaaagtga 240
tggttttttg acaactacta taaggcttgg ttttatatta attcagatgg tcgttactcg 300
cagaatgaat ggcatggaaa ttactacctg aaatcagggtg gatatatggc ccaaaacgag 360
tggtatctatg acagtaatta caagagttgg ttttatctca agtcagatgg ggcttatgct 420
catcaagaat ggcaattgat tggaaataag tgggtactact tcaagaagtg gggttacatg 480
gctaaaagcc aatggcaagg aagttatttc ttgaatggtc aaggagctat gatgcaaaat 540
gaatggctct atgatccagc ctattctgct tatttttata taaaatccga tggaacttat 600
gctaaccaag agtggcaaaa agtgggcggc aaatgggtact atttcaagaa gtggggctat 660
atggctcgga atgagtggca aggcaactac tatttgactg gaagtgggtc catggcgact 720

gacgaagtga ttatggatgg tactcgctat atctttgcgg cctctggtga gctcaaagaa 780
 aaaaaagatt tgaatgctgg ctgggttcac agagatggta agcgctatctt ctttaataat 840
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 ggtcgtatca atgattggaa aaaggttatt gatgagaacg aagtggatgg tgtcattgtt 960
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 cctatctatt atgatgttga gaattgggaa tatgtaaata agagcaagag agctccaagt 1200
 gatacaggca cttgggttaa aatcatcaac aagtacatgg acacgatgaa gcaggcgggt 1260
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 gatattttta aacatgtaaa ctgggtagcg gcctatacga atgctttaga atgggaaaac 1380
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<210> 98

<211> 490

<212> PRT

<213> Streptococcus pneumoniae

<400> 98

Met Lys Thr Lys Ile Gly Leu Ala Ser Ile Cys Leu Leu Gly Leu Ala
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Thr Ser His Val Ala Ala Asn Glu Thr Glu Val Ala Lys Thr Ser Gln
 20 25 30

Asp Thr Thr Thr Ala Ser Ser Ser Ser Glu Gln Asn Gln Ser Ser Asn
 35 40 45

Lys Thr Gln Thr Ser Ala Glu Val Gln Thr Asn Ala Ala Ala His Trp
 50 55 60

Asp Gly Asp Tyr Tyr Val Lys Asp Asp Gly Ser Lys Ala Gln Ser Glu
 65 70 75 80

Trp Ile Phe Asp Asn Tyr Tyr Lys Ala Trp Phe Tyr Ile Asn Ser Asp
 85 90 95

Gly Arg Tyr Ser Gln Asn Glu Trp His Gly Asn Tyr Tyr Leu Lys Ser
 100 105 110

Gly Gly Tyr Met Ala Gln Asn Glu Trp Ile Tyr Asp Ser Asn Tyr Lys
 115 120 125

Ser Trp Phe Tyr Leu Lys Ser Asp Gly Ala Tyr Ala His Gln Glu Trp
 130 135 140

Gln Leu Ile Gly Asn Lys Trp Tyr Tyr Phe Lys Lys Trp Gly Tyr Met
 145 150 155 160

Ala Lys Ser Gln Trp Gln Gly Ser Tyr Phe Leu Asn Gly Gln Gly Ala
 165 170 175

Met Met Gln Asn Glu Trp Leu Tyr Asp Pro Ala Tyr Ser Ala Tyr Phe
 180 185 190

Tyr Leu Lys Ser Asp Gly Thr Tyr Ala Asn Gln Glu Trp Gln Lys Val
 195 200 205
 Gly Gly Lys Trp Tyr Tyr Phe Lys Lys Trp Gly Tyr Met Ala Arg Asn
 210 215 220
 Glu Trp Gln Gly Asn Tyr Tyr Leu Thr Gly Ser Gly Ala Met Ala Thr
 225 230 235 240
 Asp Glu Val Ile Met Asp Gly Thr Arg Tyr Ile Phe Ala Ala Ser Gly
 245 250 255
 Glu Leu Lys Glu Lys Lys Asp Leu Asn Val Gly Trp Val His Arg Asp
 260 265 270
 Gly Lys Arg Tyr Phe Phe Asn Asn Arg Glu Glu Gln Val Gly Thr Glu
 275 280 285
 His Ala Lys Lys Val Ile Asp Ile Ser Glu His Asn Gly Arg Ile Asn
 290 295 300
 Asp Trp Lys Lys Val Ile Asp Glu Asn Glu Val Asp Gly Val Ile Val
 305 310 315 320
 Arg Leu Gly Tyr Ser Gly Lys Glu Asp Lys Glu Leu Ala His Asn Ile
 325 330 335
 Lys Glu Leu Asn Arg Leu Gly Ile Pro Tyr Gly Val Tyr Leu Tyr Thr
 340 345 350
 Tyr Ala Glu Asn Glu Thr Asp Ala Glu Ser Asp Ala Lys Gln Thr Ile
 355 360 365
 Glu Leu Ile Lys Lys Tyr Asn Met Asn Leu Ser Tyr Pro Ile Tyr Tyr
 370 375 380
 Asp Val Glu Asn Trp Glu Tyr Val Asn Lys Ser Lys Arg Ala Pro Ser
 385 390 395 400
 Asp Thr Gly Thr Trp Val Lys Ile Ile Asn Lys Tyr Met Asp Thr Met
 405 410 415
 Lys Gln Ala Gly Tyr Gln Asn Val Tyr Val Tyr Ser Tyr Arg Ser Leu
 420 425 430
 Leu Gln Thr Arg Leu Lys His Pro Asp Ile Leu Lys His Val Asn Trp
 435 440 445
 Val Ala Ala Tyr Thr Asn Ala Leu Glu Trp Glu Asn Pro His Tyr Ser
 450 455 460
 Gly Lys Lys Gly Trp Gln Tyr Thr Ser Ser Glu Tyr Met Lys Gly Ile
 465 470 475 480
 Gln Gly Arg Val Asp Val Ser Val Trp Tyr
 485 490

<210> 99
 <211> 774
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 99
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 agctggactc actttgaaac catgtttgga gatgggagac tcatgctgat tttggctcag 180
 acatttttct tggccttcct atcagccttg atagcgacca ttatcgggac ttttggtgcc 240
 atttacatct accagtctcg taagaaatac caagaagcct ttctatcact caataatatc 300
 ctcattggtg cgcctgacgt tatgattggt gctagcttct tgattctctt taccctaactc 360
 aagttttcac ttggcttttt gaccgttcta tctagtcacg tggccttctc cattcctatc 420
 gtggtcttga tggctttgcc tcgactcaag gaaatgaatg gcgacatgat tcatgcggcc 480
 tatgacttgg gagctagtca atttcagatg ttcaaggaaa tcatgcttcc ttacctgact 540
 ccgtctatca ttactggtta tttcatggcc ttcacctatt cgtagatga ctttgccgtg 600
 accttctttg taacaggaaa tggcttttca accctatcag tcgagattta ctctcgtgct 660
 cgcaagggga tttccttaga aatcaatgcc ctgtctgctc tagtctttct ctttagtatt 720
 atcctagtgt taggttatta ctttatctct cgtgagaagg aggagcaagc atga 774

<210> 100
 <211> 257
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 100
 Met Lys Lys Phe Ala Asn Leu Tyr Leu Gly Leu Val Phe Leu Val Leu
 1 5 10 15
 Tyr Leu Pro Ile Phe Tyr Leu Ile Gly Tyr Ala Phe Asn Ala Gly Asp
 20 25 30
 Asp Met Asn Ser Phe Thr Gly Phe Ser Trp Thr His Phe Glu Thr Met
 35 40 45
 Phe Gly Asp Gly Arg Leu Met Leu Ile Leu Ala Gln Thr Phe Phe Leu
 50 55 60
 Ala Phe Leu Ser Ala Leu Ile Ala Thr Ile Ile Gly Thr Phe Gly Ala
 65 70 75 80
 Ile Tyr Ile Tyr Gln Ser Arg Lys Lys Tyr Gln Glu Ala Phe Leu Ser
 85 90 95
 Leu Asn Asn Ile Leu Met Val Ala Pro Asp Val Met Ile Gly Ala Ser
 100 105 110
 Phe Leu Ile Leu Phe Thr Gln Leu Lys Phe Ser Leu Gly Phe Leu Thr
 115 120 125
 Val Leu Ser Ser His Val Ala Phe Ser Ile Pro Ile Val Val Leu Met
 130 135 140
 Val Leu Pro Arg Leu Lys Glu Met Asn Gly Asp Met Ile His Ala Ala

145 150 155 160
 Tyr Asp Leu Gly Ala Ser Gln Phe Gln Met Phe Lys Glu Ile Met Leu
 165 170 175
 Pro Tyr Leu Thr Pro Ser Ile Ile Thr Gly Tyr Phe Met Ala Phe Thr
 180 185 190
 Tyr Ser Leu Asp Asp Phe Ala Val Thr Phe Phe Val Thr Gly Asn Gly
 195 200 205
 Phe Ser Thr Leu Ser Val Glu Ile Tyr Ser Arg Ala Arg Lys Gly Ile
 210 215 220
 Ser Leu Glu Ile Asn Ala Leu Ser Ala Leu Val Phe Leu Phe Ser Ile
 225 230 235 240
 Ile Leu Val Val Gly Tyr Tyr Phe Ile Ser Arg Glu Lys Glu Glu Gln
 245 250 255

Ala

<210> 101
 <211> 1071
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 101
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 attgcgactc atttagatag taaaatcaat agtcgagata gtcaaaaatt gggttatctat 120
 aactggggag actatatcga tcctgaactc ttgactcagt ttacagaaga aacaggaatt 180
 caagttcagt acgagacttt tgactccaac gaagccatgt aactaagat aaagcagggt 240
 ggaacgacct acgatattgc cattccaagt gaatacatga ttaacaagat gaaggacgaa 300
 gacctcttgg ttccgcttga ttattcaaaa attgaaggaa tcgaaaatat cggaccagag 360
 tttctcaacc agtcctttga cccaggtaat aaattctcca tcccttactt ctggggaacc 420
 ttaggaattg tctacaacga aacctgggta gatgaagcgc ctgagcattg ggatgacctt 480
 tggaagccgg agtataagaa ttctatcatg ctctttgatg gggcgcgatg ggtgctggga 540
 ctaggactca attccctcgg ctacagcctc aactccaagg atctgcagca gttggaagag 600
 acagtggata agctctacaa actgactcca aatatcaagg ctatcgttgc ggacgagatg 660
 aagggtcata tgattcagaa taatggttgc atcggcgatg ccttctctgg tgaagccagc 720
 caaatgttag aaaaaaatga aaatctacgt tatgtggtac cgacagaggc cagcaatctt 780
 tggtttgaca atatggtcat tcccaaaaca gttaaaaacc aaaactcagc ctatgccttt 840
 atcaacttta tgttgaaacc tgaaaatgct ctccaaaatg cggagtatgt cggctattca 900
 acaccaaacc taccagcgaa ggaattgctc ccagaggaaa caaaggaaga taaggccttc 960
 tatcccgatg ttgaaaccat gaaacaccta gaagtttatg agaaatttga ccataaatgg 1020
 acagggaat atagcgacct cttcctacag tttaaaatgt atcggaagta g 1071

<210> 102
 <211> 356
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 102

Met Lys Lys Ile Tyr Ser Phe Leu Ala Gly Ile Ala Ala Ile Ile Leu
1 5 10 15
Val Leu Trp Gly Ile Ala Thr His Leu Asp Ser Lys Ile Asn Ser Arg
20 25 30
Asp Ser Gln Lys Leu Val Ile Tyr Asn Trp Gly Asp Tyr Ile Asp Pro
35 40 45
Glu Leu Leu Thr Gln Phe Thr Glu Glu Thr Gly Ile Gln Val Gln Tyr
50 55 60
Glu Thr Phe Asp Ser Asn Glu Ala Met Tyr Thr Lys Ile Lys Gln Gly
65 70 75 80
Gly Thr Thr Tyr Asp Ile Ala Ile Pro Ser Glu Tyr Met Ile Asn Lys
85 90 95
Met Lys Asp Glu Asp Leu Leu Val Pro Leu Asp Tyr Ser Lys Ile Glu
100 105 110
Gly Ile Glu Asn Ile Gly Pro Glu Phe Leu Asn Gln Ser Phe Asp Pro
115 120 125
Gly Asn Lys Phe Ser Ile Pro Tyr Phe Trp Gly Thr Leu Gly Ile Val
130 135 140
Tyr Asn Glu Thr Met Val Asp Glu Ala Pro Glu His Trp Asp Asp Leu
145 150 155 160
Trp Lys Pro Glu Tyr Lys Asn Ser Ile Met Leu Phe Asp Gly Ala Arg
165 170 175
Glu Val Leu Gly Leu Gly Leu Asn Ser Leu Gly Tyr Ser Leu Asn Ser
180 185 190
Lys Asp Leu Gln Gln Leu Glu Glu Thr Val Asp Lys Leu Tyr Lys Leu
195 200 205
Thr Pro Asn Ile Lys Ala Ile Val Ala Asp Glu Met Lys Gly Tyr Met
210 215 220
Ile Gln Asn Asn Val Ala Ile Gly Val Thr Phe Ser Gly Glu Ala Ser
225 230 235 240
Gln Met Leu Glu Lys Asn Glu Asn Leu Arg Tyr Val Val Pro Thr Glu
245 250 255
Ala Ser Asn Leu Trp Phe Asp Asn Met Val Ile Pro Lys Thr Val Lys
260 265 270
Asn Gln Asn Ser Ala Tyr Ala Phe Ile Asn Phe Met Leu Lys Pro Glu
275 280 285
Asn Ala Leu Gln Asn Ala Glu Tyr Val Gly Tyr Ser Thr Pro Asn Leu
290 295 300

Pro Ala Lys Glu Leu Leu Pro Glu Glu Thr Lys Glu Asp Lys Ala Phe
 305 310 315 320

Tyr Pro Asp Val Glu Thr Met Lys His Leu Glu Val Tyr Glu Lys Phe
 325 330 335

Asp His Lys Trp Thr Gly Lys Tyr Ser Asp Leu Phe Leu Gln Phe Lys
 340 345 350

Met Tyr Arg Lys
 355

<210> 103
 <211> 1851
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 103
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 aagcagggttt tctggggaat atttgatatt ttcagtatgg tggtttccat cattgtatct 120
 tatattttat tttatgggct gattaatcca gcacctgttg actacattat ctatacgagt 180
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 cgttacagca agattacgga tttcatgaaa atcttttttg gtgtgactgc tagcagtgtc 300
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 tccagacgca aaaaaggtag tggatgatga gaacaccgtc ggaccttctt gattgggtgcc 480
 ggtgatgggtg gggctctttt tatggatagt taccaacatc caaccagtga attagaactg 540
 gtcgggtattt tggataagga ttctaagaaa aagggtcaaa aacttgggtg tattcctgtt 600
 ttgggctctt atgacaatct gcctgaatta gccaaacgcc atcaaatcga gcgtgtcatc 660
 gttgcgattc cgtcgctgga tccgtcagaa tatgagcgta tcttgcagat gtgtaataag 720
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 gcaggtagctg gcttccaaaa aattgatatt acggacctt tgggtcgtca ggaaatccgt 840
 cttgacgaat cgcgtctggg tgcagaactg acaggtaaga ccatcttagt cacaggagct 900
 ggagggtcaa tcggttctga aatctgtcgt caagttagtc gcttcaatcc tgaacgcatt 960
 gtcttgctcg gtcatgggga aaactcaatc taccttgttt atcatgaatt gattcgtaag 1020
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 caagtctttg agcagtacaa acctgctatt gtttatcatg cggcagccca caagcatgtt 1140
 cctatgatgg agcgcaatcc aaaagaagcc ttcaaaaaca atatccgtgg aacttacaat 1200
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 gcagtcaatc caccaaagt tatgggagca accaagcgcg tggcggagtt gattgtcact 1320
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 attccaatcg ttgaagtgg aatccgcca ggtgaaaaac tctacgaaga actcttggt 1680
 tcaaccgaac tcgttgataa tcaagttatg gataagattt tcgttggtaa ggttaatgtc 1740
 atgccttttag aatccatcaa tcaaaagatt ggagagttcc gcactctcag tggagatgag 1800
 ttgaagcaag ctattatcgc ctttgctaata caaacaaccc acattgaata a 1851

<210> 104
 <211> 616
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 104

Met Asn Lys Lys Leu Thr Asp Tyr Val Ile Asp Leu Val Glu Ile Leu
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Asn Lys Gln Gln Lys Gln Val Phe Trp Gly Ile Phe Asp Ile Phe Ser
20 25 30

Met Val Val Ser Ile Ile Val Ser Tyr Ile Leu Phe Tyr Gly Leu Ile
35 40 45

Asn Pro Ala Pro Val Asp Tyr Ile Ile Tyr Thr Ser Leu Ala Phe Leu
50 55 60

Phe Tyr Gln Leu Met Ile Gly Phe Trp Gly Leu Asn Ala Ser Ile Ser
65 70 75 80

Arg Tyr Ser Lys Ile Thr Asp Phe Met Lys Ile Phe Phe Gly Val Thr
85 90 95

Ala Ser Ser Val Leu Ser Tyr Ser Ile Cys Tyr Ala Phe Leu Pro Leu
100 105 110

Phe Ser Ile Arg Phe Ile Ile Leu Phe Ile Leu Leu Ser Thr Phe Leu
115 120 125

Ile Leu Leu Pro Arg Ile Thr Trp Gln Leu Ile Tyr Ser Arg Arg Lys
130 135 140

Lys Gly Ser Gly Asp Gly Glu His Arg Arg Thr Phe Leu Ile Gly Ala
145 150 155 160

Gly Asp Gly Gly Ala Leu Phe Met Asp Ser Tyr Gln His Pro Thr Ser
165 170 175

Glu Leu Glu Leu Val Gly Ile Leu Asp Lys Asp Ser Lys Lys Lys Gly
180 185 190

Gln Lys Leu Gly Gly Ile Pro Val Leu Gly Ser Tyr Asp Asn Leu Pro
195 200 205

Glu Leu Ala Lys Arg His Gln Ile Glu Arg Val Ile Val Ala Ile Pro
210 215 220

Ser Leu Asp Pro Ser Glu Tyr Glu Arg Ile Leu Gln Met Cys Asn Lys
225 230 235 240

Leu Gly Val Lys Cys Tyr Lys Met Pro Lys Val Glu Thr Val Val Gln
245 250 255

Gly Leu His Gln Ala Gly Thr Gly Phe Gln Lys Ile Asp Ile Thr Asp
260 265 270

Leu Leu Gly Arg Gln Glu Ile Arg Leu Asp Glu Ser Arg Leu Gly Ala
275 280 285

Glu Leu Thr Gly Lys Thr Ile Leu Val Thr Gly Ala Gly Gly Ser Ile

290	295	300
Gly Ser Glu Ile Cys Arg Gln Val Ser Arg Phe Asn Pro Glu Arg Ile 305 310 315 320		
Val Leu Leu Gly His Gly Glu Asn Ser Ile Tyr Leu Val Tyr His Glu 325 330 335		
Leu Ile Arg Lys Phe Gln Gly Ile Asp Tyr Val Pro Val Ile Ala Asp 340 345 350		
Ile Gln Asp Tyr Asp Arg Leu Leu Gln Val Phe Glu Gln Tyr Lys Pro 355 360 365		
Ala Ile Val Tyr His Ala Ala Ala His Lys His Val Pro Met Met Glu 370 375 380		
Arg Asn Pro Lys Glu Ala Phe Lys Asn Asn Ile Arg Gly Thr Tyr Asn 385 390 395 400		
Val Ala Lys Ala Val Asp Glu Ala Lys Val Ser Lys Met Val Met Ile 405 410 415		
Ser Thr Asp Lys Ala Val Asn Pro Pro Asn Val Met Gly Ala Thr Lys 420 425 430		
Arg Val Ala Glu Leu Ile Val Thr Gly Phe Asn Gln Arg Ser Gln Ser 435 440 445		
Thr Tyr Cys Ala Val Arg Phe Gly Asn Val Leu Gly Ser Arg Gly Ser 450 455 460		
Val Ile Pro Val Phe Glu Arg Gln Ile Ala Glu Gly Gly Pro Val Thr 465 470 475 480		
Val Thr Asp Phe Arg Met Thr Arg Tyr Phe Met Thr Ile Pro Glu Ala 485 490 495		
Ser Arg Leu Val Ile His Ala Gly Ala Tyr Ala Lys Asp Gly Glu Val 500 505 510		
Phe Ile Leu Asp Met Gly Lys Pro Val Lys Ile Tyr Asp Leu Ala Lys 515 520 525		
Lys Met Val Leu Leu Ser Gly His Thr Glu Ser Glu Ile Pro Ile Val 530 535 540		
Glu Val Gly Ile Arg Pro Gly Glu Lys Leu Tyr Glu Glu Leu Leu Val 545 550 555 560		
Ser Thr Glu Leu Val Asp Asn Gln Val Met Asp Lys Ile Phe Val Gly 565 570 575		
Lys Val Asn Val Met Pro Leu Glu Ser Ile Asn Gln Lys Ile Gly Glu 580 585 590		
Phe Arg Thr Leu Ser Gly Asp Glu Leu Lys Gln Ala Ile Ile Ala Phe		

595

600

605

Ala Asn Gln Thr Thr His Ile Glu
610 615

<210> 105

<211> 1338

<212> DNA

<213> Streptococcus pneumoniae

<400> 105

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<210> 106

<211> 445

<212> PRT

<213> Streptococcus pneumoniae

<400> 106

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Glu Ser Leu Val Ala Thr Gly Leu Ser Gln Leu Gly Val Val Ile Asp
20 25 30

Ala Asp Gly Phe Leu Pro Asp Gly Leu Leu Ser Pro Phe Thr Tyr Tyr
35 40 45

Leu Gly Tyr Glu Asp Gly Lys Pro Leu Tyr Phe Asn Gln Val Pro Val
50 55 60

Ser Asp Phe Trp Glu Ile Leu Gly Asp Asn Gln Ser Ala Cys Ile Glu

65	70	75	80
Asp Val Thr Gln Glu Arg Ala Val Ile His Tyr Ala Asp Gly Met Gln	85	90	95
Ala Arg Leu Val Lys Gln Val Asp Trp Lys Asp Leu Glu Gly Arg Val	100	105	110
Arg Gln Val Asp His Tyr Asn Arg Phe Gly Ala Cys Phe Ala Thr Thr	115	120	125
Thr Tyr Ser Ala Asp Ser Glu Pro Ile Met Thr Val Tyr Gln Asp Val	130	135	140
Asn Gly Gln Gln Val Leu Leu Glu Asn His Val Thr Gly Asp Ile Leu	145	150	155
Leu Thr Leu Pro Gly Gln Ser Met Arg Tyr Phe Ala Asn Lys Val Glu	165	170	175
Phe Ile Thr Phe Phe Leu Gln Asp Leu Glu Ile Asp Thr Ser Gln Leu	180	185	190
Ile Phe Asn Thr Leu Ala Thr Pro Phe Leu Val Ser Phe His His Pro	195	200	205
Asp Lys Ser Gly Ser Asp Val Leu Val Trp Gln Glu Pro Leu Tyr Asp	210	215	220
Ala Ile Pro Gly Asn Met Gln Leu Ile Leu Glu Ser Asp Asn Val Arg	225	230	235
Thr Lys Lys Ile Ile Ile Pro Asn Lys Ala Thr Tyr Glu Arg Ala Leu	245	250	255
Glu Leu Thr Asp Glu Lys Tyr His Asp Gln Phe Val His Leu Gly Tyr	260	265	270
His Tyr Gln Phe Lys Arg Asp Asn Phe Leu Arg Arg Asp Ala Leu Ile	275	280	285
Leu Thr Asn Ser Asp Gln Ile Glu Gln Val Glu Ala Ile Ala Gly Ala	290	295	300
Leu Pro Asp Val Thr Phe Arg Ile Ala Ala Val Thr Glu Met Ser Ser	305	310	315
Lys Leu Leu Asp Met Leu Cys Tyr Pro Asn Val Ala Leu Tyr Gln Asn	325	330	335
Ala Ser Pro Gln Lys Ile Gln Glu Leu Tyr Gln Leu Ser Asp Ile Tyr	340	345	350
Leu Asp Ile Asn His Ser Asn Glu Leu Leu Gln Ala Val Arg Gln Ala	355	360	365
Phe Glu His Asn Leu Leu Ile Leu Gly Phe Asn Gln Thr Val His Asn			

370

375

380

Arg Leu Tyr Ile Ala Pro Asp His Leu Phe Glu Ser Ser Glu Val Ala
385 390 395 400

Ala Leu Val Glu Thr Ile Lys Leu Ala Leu Ser Asp Val Asp Gln Met
405 410 415

Arg Gln Ala Leu Gly Lys Gln Gly Gln His Ala Asn Tyr Val Asp Leu
420 425 430

Val Arg Tyr Gln Glu Thr Met Gln Thr Val Leu Gly Gly
435 440 445

<210> 107

<211> 1512

<212> DNA

<213> Streptococcus pneumoniae

<400> 107

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<210> 108

<211> 503

<212> PRT

<213> Streptococcus pneumoniae

<400> 108

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Val Glu Tyr Ala Gln Ala Tyr Arg Ala Gly Val Phe Arg Lys Leu Asn	20	25	30
Leu Ser Ser Lys Phe Ile Phe Thr Asp Met Ile Leu Ala Asp Asn Ile	35	40	45
Gln His Leu Thr Ala Asn Ile Gly Phe Asp Asp Asn Gln Val Ile Trp	50	55	60
Leu Tyr Asn His Phe Thr Asp Ile Lys Ile Ala Pro Thr Ser Val Thr	65	70	75
Val Asp Asp Val Leu Ala Tyr Phe Gly Gly Glu Glu Ser His Arg Glu	85	90	95
Lys Asn Gly Lys Val Leu Arg Val Phe Phe Phe Asp Gln Asp Lys Phe	100	105	110
Val Thr Cys Tyr Leu Val Asp Glu Asn Lys Asp Leu Val Gln His Ala	115	120	125
Glu Tyr Val Phe Lys Gly Asn Leu Ile Arg Lys Asp Tyr Phe Ser Tyr	130	135	140
Thr Arg Tyr Cys Ser Glu Tyr Phe Ala Pro Lys Asp Asn Val Ala Val	145	150	155
Leu Tyr Gln Arg Thr Phe Tyr Asn Glu Asp Gly Thr Pro Val Tyr Asp	165	170	175
Ile Leu Met Asn Gln Gly Lys Glu Glu Val Tyr His Phe Lys Asp Lys	180	185	190
Ile Phe Tyr Gly Lys Gln Ala Phe Val Arg Ala Phe Met Lys Ser Leu	195	200	205
Asn Leu Asn Lys Ser Asp Leu Val Ile Leu Asp Arg Glu Thr Gly Ile	210	215	220
Gly Gln Val Val Phe Glu Glu Ala Gln Thr Ala His Leu Ala Val Val	225	230	235
Val His Ala Glu His Tyr Ser Glu Asn Ala Thr Asn Glu Asp Tyr Ile	245	250	255
Leu Trp Asn Asn Tyr Tyr Asp Tyr Gln Phe Thr Asn Ala Asp Lys Val	260	265	270
Asp Phe Phe Ile Val Ser Thr Asp Arg Gln Asn Glu Val Leu Gln Glu	275	280	285
Gln Phe Ala Lys Tyr Thr Gln His Gln Pro Lys Ile Val Thr Ile Pro	290	295	300
Val Gly Ser Ile Asp Ser Leu Thr Asp Ser Ser Gln Gly Arg Lys Pro			

305	310	315	320
Phe Ser Leu Ile Thr Ala Ser Arg Leu Ala Lys Glu Lys His Ile Asp			
	325	330	335
Trp Leu Val Lys Ala Val Ile Glu Ala His Lys Glu Leu Pro Glu Leu			
	340	345	350
Thr Phe Asp Ile Tyr Gly Ser Gly Gly Glu Asp Ser Leu Leu Arg Glu			
	355	360	365
Ile Ile Ala Asn His Gln Ala Glu Asp Tyr Ile Gln Leu Lys Gly His			
	370	375	380
Ala Glu Leu Ser Gln Ile Tyr Ser Gln Tyr Glu Val Tyr Leu Thr Ala			
	385	390	395
Ser Thr Ser Glu Gly Phe Gly Leu Thr Leu Met Glu Ala Ile Gly Ser			
	405	410	415
Gly Leu Pro Leu Ile Gly Phe Asp Val Pro Tyr Gly Asn Gln Thr Phe			
	420	425	430
Ile Glu Asp Gly Gln Asn Gly Tyr Leu Ile Pro Ser Ser Ser Asp His			
	435	440	445
Val Glu Asp Gln Ile Lys Gln Ala Tyr Ala Ala Lys Ile Cys Gln Leu			
	450	455	460
Tyr Gln Glu Asn Arg Leu Glu Ala Met Arg Ala Tyr Ser Tyr Gln Ile			
	465	470	475
Ala Glu Gly Phe Leu Thr Lys Glu Ile Leu Glu Lys Trp Lys Lys Thr			
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Val Glu Glu Val Leu His Asp			
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<210> 109
 <211> 2292
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 109
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<210> 110

<211> 763

<212> PRT

<213> Streptococcus pneumoniae

<400> 110

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Met Ser Ser Leu Ser Asp Gln Glu Leu Val Ala Lys Thr Val Glu Phe
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Arg Gln Arg Leu Ser Glu Gly Glu Ser Leu Asp Asp Ile Leu Val Glu
      20             25             30

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Ala Phe Ala Val Val Arg Glu Ala Asp Lys Arg Ile Leu Gly Met Phe
      35             40             45

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Pro Tyr Asp Val Gln Val Met Gly Ala Ile Val Met His Tyr Gly Asn
      50             55             60

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Val Ala Glu Met Asn Thr Gly Glu Gly Lys Thr Leu Thr Ala Thr Met
      65             70             75             80

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Pro Val Tyr Leu Asn Ala Phe Ser Gly Glu Gly Val Met Val Val Thr
      85             90             95

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Pro Asn Glu Tyr Leu Ser Lys Arg Asp Ala Glu Glu Met Gly Gln Val
      100            105            110

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Tyr Arg Phe Leu Gly Leu Thr Ile Gly Val Pro Phe Thr Glu Asp Pro
 115 120 125
 Lys Lys Glu Met Lys Ala Glu Glu Lys Lys Leu Ile Tyr Ala Ser Asp
 130 135 140
 Ile Ile Tyr Thr Thr Asn Ser Asn Leu Gly Phe Asp Tyr Leu Asn Asp
 145 150 155 160
 Asn Leu Ala Ser Asn Glu Glu Gly Lys Phe Leu Arg Pro Phe Asn Tyr
 165 170 175
 Val Ile Ile Asp Glu Ile Asp Asp Ile Leu Leu Asp Ser Ala Gln Thr
 180 185 190
 Pro Leu Ile Ile Ala Gly Ser Pro Arg Val Gln Ser Asn Tyr Tyr Ala
 195 200 205
 Ile Ile Asp Thr Leu Val Thr Thr Leu Val Glu Gly Glu Asp Tyr Ile
 210 215 220
 Phe Lys Glu Glu Lys Glu Glu Val Trp Leu Thr Thr Lys Gly Ala Lys
 225 230 235 240
 Ser Ala Glu Asn Phe Leu Gly Ile Asp Asn Leu Tyr Lys Glu Glu His
 245 250 255
 Ala Ser Phe Ala Arg His Leu Val Tyr Ala Ile Arg Ala His Lys Leu
 260 265 270
 Phe Thr Lys Asp Lys Asp Tyr Ile Ile Arg Gly Asn Glu Met Val Leu
 275 280 285
 Val Asp Lys Gly Thr Gly Arg Leu Met Glu Met Thr Lys Leu Gln Gly
 290 295 300
 Gly Leu His Gln Ala Ile Glu Ala Lys Glu His Val Lys Leu Ser Pro
 305 310 315 320
 Glu Thr Arg Ala Met Ala Ser Ile Thr Tyr Gln Ser Leu Phe Lys Met
 325 330 335
 Phe Asn Lys Ile Ser Gly Met Thr Gly Thr Gly Lys Val Ala Glu Lys
 340 345 350
 Glu Phe Ile Glu Thr Tyr Asn Met Ser Val Val Arg Ile Pro Thr Asn
 355 360 365
 Arg Pro Arg Gln Arg Ile Asp Tyr Pro Asp Asn Leu Tyr Ile Thr Leu
 370 375 380
 Pro Glu Lys Val Tyr Ala Ser Leu Glu Tyr Ile Lys Gln Tyr His Ala
 385 390 395 400
 Lys Gly Asn Pro Leu Leu Val Phe Val Gly Ser Val Glu Met Ser Gln
 405 410 415

Leu Tyr Ser Ser Leu Leu Phe Arg Glu Gly Ile Ala His Asn Val Leu
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 Asp Ile Lys Leu Gly Lys Gly Val Ala Glu Leu Gly Gly Leu Ile Val
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 485 490 495
 Gly Arg Ser Gly Arg Gln Gly Asp Pro Gly Met Ser Lys Phe Phe Val
 500 505 510
 Ser Leu Glu Asp Asp Val Ile Lys Lys Phe Gly Pro Ser Trp Val His
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 Lys Lys Tyr Lys Asp Tyr Gln Val Gln Asp Met Thr Gln Pro Glu Val
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 595 600 605
 Glu Arg Tyr Thr Glu Glu Val Ala Ala Asp His Tyr Ala Ser Arg Glu
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 625 630 635 640
 Val Pro Asp Tyr Ile Asp Val Thr Asp Lys Thr Ala Val Arg Ser Phe
 645 650 655
 Met Lys Gln Val Ile Asp Lys Glu Leu Ser Glu Lys Lys Glu Leu Leu
 660 665 670
 Asn Gln His Asp Leu Tyr Glu Gln Phe Leu Arg Leu Ser Leu Leu Lys
 675 680 685
 Ala Ile Asp Asp Asn Trp Val Glu Gln Val Asp Tyr Leu Gln Gln Leu
 690 695 700
 Ser Met Ala Ile Gly Gly Gln Ser Ala Ser Gln Lys Asn Pro Ile Val
 705 710 715 720

Glu Tyr Tyr Gln Glu Ala Tyr Ala Gly Phe Glu Ala Met Lys Glu Gln
725 730 735

Ile His Ala Asp Met Val Arg Asn Leu Leu Met Gly Leu Val Glu Val
740 745 750

Thr Pro Lys Gly Glu Ile Val Thr His Phe Pro
755 760

<210> 111

<211> 879

<212> DNA

<213> Streptococcus pneumoniae

<400> 111

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<210> 112

<211> 292

<212> PRT

<213> Streptococcus pneumoniae

<400> 112

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Glu Arg Ile Pro Asp Leu Asp Thr Pro Ile Glu Lys Asn Thr Gln Leu
35 40 45

Glu Glu Glu Val Ser Gln Ala Glu Val Glu Leu Glu Ser Gln Gln Glu
50 55 60

Glu Lys Ile Glu Ala Pro Glu Asp Ser Glu Ala Arg Thr Glu Ile Glu
65 70 75 80

Glu Lys Lys Ala Ser Asn Ser Thr Glu Glu Glu Pro Asp Leu Ser Lys
85 90 95

Glu Thr Glu Lys Val Thr Ile Ala Glu Glu Ser Gln Glu Ala Leu Pro
 100 105 110
 Gln Gln Lys Ala Thr Thr Lys Glu Pro Leu Leu Ile Ser Lys Ser Leu
 115 120 125
 Glu Ser Pro Tyr Ile Pro Asp Gln Ala Pro Lys Ser Arg Asp Lys Trp
 130 135 140
 Lys Glu Gln Val Leu Asp Phe Trp Ser Trp Leu Val Glu Ala Ile Lys
 145 150 155 160
 Ser Pro Thr Ser Lys Leu Glu Thr Ser Ile Thr His Ser Tyr Thr Ala
 165 170 175
 Phe Leu Leu Leu Ile Leu Phe Ser Ala Ser Ser Phe Phe Phe Ser Ile
 180 185 190
 Tyr His Ile Lys His Ala Tyr Tyr Gly His Ile Ala Ser Ile Asn Ser
 195 200 205
 Arg Phe Pro Glu Gln Leu Ala Pro Leu Thr Leu Phe Ser Ile Ile Ser
 210 215 220
 Ile Leu Val Ala Thr Thr Leu Phe Phe Phe Ser Phe Leu Leu Gly Ser
 225 230 235 240
 Phe Val Val Arg Arg Phe Ile His Gln Glu Lys Asp Trp Thr Leu Asp
 245 250 255
 Lys Val Leu Gln Gln Tyr Ser Gln Leu Leu Ala Ile Pro Ile Ser Ser
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 Pro Ser Cys Val
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<210> 113
 <211> 327
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 113
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<210> 114

<211> 108
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 114

Met Tyr Phe Pro Thr Ser Ser Ala Leu Ile Glu Phe Leu Ile Leu Ala
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Val Leu Glu Gln Gly Asp Ser Tyr Gly Tyr Glu Ile Ser Gln Thr Ile
 20 25 30

Lys Leu Ile Ala Asn Ile Lys Glu Ser Thr Leu Tyr Pro Ile Leu Lys
 35 40 45

Lys Leu Glu Gly Asn Ser Phe Leu Thr Thr Tyr Ser Arg Glu Phe Gln
 50 55 60

Gly Arg Met Arg Lys Tyr Tyr Ser Leu Thr Asn Gly Gly Ile Glu Gln
 65 70 75 80

Leu Leu Thr Leu Lys Asp Glu Trp Ala Leu Tyr Thr Asp Thr Ile Asn
 85 90 95

Gly Ile Ile Glu Gly Ser Ile Arg His Asp Lys Asn
 100 105

<210> 115
 <211> 954
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 115

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gctggccttg	tccaaggaga	tgccgttcgc	ccacaaatgc	tcaaagaaag	cgatgtggtc	540
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gcttctagcc	aagaacatac	ttacgccccat	cacttgctca	tggaacaagg	gcttaagtac	660
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aatgaaatag	cagtagagcc	ttttgtttat	ccacttgcta	gcttgcaaga	tgcaagtgtt	900
ttaatgaaat	ttaaagaaaa	ttttcaaaaa	tggactcaag	gtactgaaat	ataa	954

<210> 116
 <211> 317
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 116

Met Asp Phe Glu Lys Ile Glu Gln Ala Tyr Ile Tyr Leu Leu Glu Asn
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Val Gln Val Ile Gln Ser Asp Leu Ala Thr Asn Phe Tyr Asp Ala Leu
20 25 30

Val Glu Gln Asn Ser Ile Tyr Leu Asp Gly Glu Thr Glu Leu Asn Gln
35 40 45

Val Lys Asp Asn Asn Gln Ala Leu Lys Arg Leu Ala Leu Arg Lys Glu
50 55 60

Glu Trp Leu Lys Thr Tyr Gln Phe Leu Leu Met Lys Ala Gly Gln Thr
65 70 75 80

Glu Pro Leu Gln Ala Asn His Gln Phe Thr Pro Asp Ala Ile Ala Leu
85 90 95

Leu Leu Val Phe Ile Val Glu Glu Leu Phe Lys Glu Glu Glu Ile Thr
100 105 110

Ile Leu Glu Met Gly Ser Gly Met Gly Ile Leu Gly Ala Ile Phe Leu
115 120 125

Thr Ser Leu Thr Lys Lys Val Asp Tyr Leu Gly Met Glu Val Asp Asp
130 135 140

Leu Leu Ile Asp Leu Ala Ala Ser Met Ala Asp Val Ile Gly Leu Gln
145 150 155 160

Ala Gly Phe Val Gln Gly Asp Ala Val Arg Pro Gln Met Leu Lys Glu
165 170 175

Ser Asp Val Val Ile Ser Asp Leu Pro Val Gly Tyr Tyr Pro Asp Asp
180 185 190

Ala Val Ala Ser Arg His Gln Val Ala Ser Ser Gln Glu His Thr Tyr
195 200 205

Ala His His Leu Leu Met Glu Gln Gly Leu Lys Tyr Leu Lys Ser Asp
210 215 220

Gly Tyr Ala Ile Phe Leu Ala Pro Ser Asp Leu Leu Thr Ser Pro Gln
225 230 235 240

Ser Asp Leu Leu Lys Glu Trp Leu Lys Glu Glu Ala Ser Leu Val Ala
245 250 255

Met Ile Ser Leu Pro Glu Asn Leu Phe Ala Asn Ala Lys Gln Ser Lys
260 265 270

Thr Ile Phe Ile Leu Gln Lys Lys Asn Glu Ile Ala Val Glu Pro Phe
275 280 285

Val Tyr Pro Leu Ala Ser Leu Gln Asp Ala Ser Val Leu Met Lys Phe
290 295 300

Lys Glu Asn Phe Gln Lys Trp Thr Gln Gly Thr Glu Ile
 305 310 315

<210> 117
 <211> 1902
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 117
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 aataagaaaa aagatatttc tctgtcttac ctagcccaag atagccggtt tgagtctgaa 240
 aataccatct acgatgaaat gcttcatgtc tttaatgatt tgcgtcggac ggagagacaa 300
 ctgcgtcaga tggagctgga gatgggtgaa aagtctgggt aggatttggg taaactgatg 360
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 gatattcgag cgattttgaa tggattcaag tttgacgagt ctatgtggca gatgaaaatt 480
 gctgagcttt ctggtgggtca aaatactcgt ttggcacttg ccaaaatgct ccttgaaaag 540
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 ctagagaatt acttggtaaa ctatagcggg gccctcatta tcgtcagcca cgaccgttat 660
 ttcttggaca aggttgcgac aattacgcta gatttgacca agcattcctt ggatcgctat 720
 gtggggaatt actctcggtt tgtcgaattg aaggagcaaa agctagttag tgaggcaaaa 780
 aactatgaaa agcaacagaa ggaaatcgct gctctggaag actttgtcaa tcgcaatcta 840
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 cgtttggaca agcctgaagc tggcaagaaa gcagccaaca tgaccttcca gtctgaaaaa 960
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 aatggtatcg gcaagtcaac ctttatcaag tctattgtgg accagattcc ttttatcaag 1140
 ggagaaaagc gctttggcgc taatgttgag gttgggtact atgaccaaac ccaaagcaag 1200
 ctgacaccaa gtaatacggg gctggatgaa ctctggaatg atttcaaact gacaccagaa 1260
 gttgaaatcc gcaaccgtct tggagccttc cttttctcag gagatgatgt taaaaaatca 1320
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 gaagctatgc ttgagtggga agaattatca gagcaggtgt aa 1902

<210> 118
 <211> 633
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 118
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 Val Leu Phe Asp Asn Ile Asn Leu Gln Val Asp Glu Arg Asp Arg Ile
 20 25 30

Ala Leu Val Gly Lys Asn Gly Ala Gly Lys Ser Thr Leu Leu Lys Ile
 35 40 45
 Leu Val Gly Glu Glu Glu Pro Thr Ser Gly Glu Ile Asn Lys Lys Lys
 50 55 60
 Asp Ile Ser Leu Ser Tyr Leu Ala Gln Asp Ser Arg Phe Glu Ser Glu
 65 70 75 80
 Asn Thr Ile Tyr Asp Glu Met Leu His Val Phe Asn Asp Leu Arg Arg
 85 90 95
 Thr Glu Arg Gln Leu Arg Gln Met Glu Leu Glu Met Gly Glu Lys Ser
 100 105 110
 Gly Glu Asp Leu Asp Lys Leu Met Ser Asp Tyr Asp Arg Leu Ser Glu
 115 120 125
 Asn Phe Arg Gln Ala Gly Gly Phe Thr Tyr Glu Ala Asp Ile Arg Ala
 130 135 140
 Ile Leu Asn Gly Phe Lys Phe Asp Glu Ser Met Trp Gln Met Lys Ile
 145 150 155 160
 Ala Glu Leu Ser Gly Gly Gln Asn Thr Arg Leu Ala Leu Ala Lys Met
 165 170 175
 Leu Leu Glu Lys Pro Asn Leu Leu Val Leu Asp Glu Pro Thr Asn His
 180 185 190
 Leu Asp Ile Glu Thr Ile Ala Trp Leu Glu Asn Tyr Leu Val Asn Tyr
 195 200 205
 Ser Gly Ala Leu Ile Ile Val Ser His Asp Arg Tyr Phe Leu Asp Lys
 210 215 220
 Val Ala Thr Ile Thr Leu Asp Leu Thr Lys His Ser Leu Asp Arg Tyr
 225 230 235 240
 Val Gly Asn Tyr Ser Arg Phe Val Glu Leu Lys Glu Gln Lys Leu Val
 245 250 255
 Thr Glu Ala Lys Asn Tyr Glu Lys Gln Gln Lys Glu Ile Ala Ala Leu
 260 265 270
 Glu Asp Phe Val Asn Arg Asn Leu Val Arg Ala Ser Thr Thr Lys Arg
 275 280 285
 Ala Gln Ser Arg Arg Lys Gln Leu Glu Lys Met Glu Arg Leu Asp Lys
 290 295 300
 Pro Glu Ala Gly Lys Lys Ala Ala Asn Met Thr Phe Gln Ser Glu Lys
 305 310 315 320
 Thr Ser Gly Asn Val Val Leu Thr Val Glu Asn Ala Ala Val Gly Tyr
 325 330 335

Asp Gly Glu Val Leu Ser Gln Pro Ile Asn Leu Asp Leu Arg Lys Met
 340 345 350
 Asn Ala Val Ala Ile Val Gly Pro Asn Gly Ile Gly Lys Ser Thr Phe
 355 360 365
 Ile Lys Ser Ile Val Asp Gln Ile Pro Phe Ile Lys Gly Glu Lys Arg
 370 375 380
 Phe Gly Ala Asn Val Glu Val Gly Tyr Tyr Asp Gln Thr Gln Ser Lys
 385 390 395 400
 Leu Thr Pro Ser Asn Thr Val Leu Asp Glu Leu Trp Asn Asp Phe Lys
 405 410 415
 Leu Thr Pro Glu Val Glu Ile Arg Asn Arg Leu Gly Ala Phe Leu Phe
 420 425 430
 Ser Gly Asp Asp Val Lys Lys Ser Val Gly Met Leu Ser Gly Gly Glu
 435 440 445
 Lys Ala Arg Leu Leu Leu Ala Lys Leu Ser Met Glu Asn Asn Asn Phe
 450 455 460
 Leu Ile Leu Asp Glu Pro Thr Asn His Leu Asp Ile Asp Ser Lys Glu
 465 470 475 480
 Val Leu Glu Asn Ala Leu Ile Asp Phe Asp Gly Thr Leu Leu Phe Val
 485 490 495
 Ser His Asp Arg Tyr Phe Ile Asn Arg Val Ala Thr His Val Leu Glu
 500 505 510
 Leu Ser Glu Asn Gly Ser Thr Leu Tyr Leu Gly Asp Tyr Asp Tyr Tyr
 515 520 525
 Val Glu Lys Lys Ala Thr Ala Glu Met Ser Gln Thr Glu Glu Ala Ser
 530 535 540
 Thr Ser Asn Gln Ala Lys Glu Ala Ser Pro Val Asn Asp Tyr Gln Ala
 545 550 555 560
 Gln Lys Glu Ser Gln Lys Glu Val Arg Lys Leu Met Arg Gln Ile Glu
 565 570 575
 Ser Leu Glu Ala Glu Ile Glu Glu Leu Glu Ser Gln Ser Gln Ala Ile
 580 585 590
 Ser Glu Gln Met Leu Glu Thr Asn Asp Ala Asp Lys Leu Met Glu Leu
 595 600 605
 Gln Ala Glu Leu Asp Lys Ile Ser His Arg Gln Glu Glu Ala Met Leu
 610 615 620
 Glu Trp Glu Glu Leu Ser Glu Gln Val
 625 630

<210> 119
 <211> 1179
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 119
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<210> 120
 <211> 392
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 120
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 35 40 45
 Leu Val Thr Ser Ile Leu Val Asn Pro Phe Gly Gly Val Ile Ser Asp
 50 55 60
 Arg Phe Ser Arg Arg Lys Ile Leu Met Thr Ala Asp Leu Val Cys Gly
 65 70 75 80
 Ile Leu Cys Leu Ala Ile Ser Phe Ile Arg Asn Asp Ser Trp Met Ile
 85 90 95
 Gly Ala Leu Ile Val Ala Asn Ile Val Gln Ala Ile Ala Phe Ala Phe
 100 105 110

Ser Arg Thr Ala Asn Lys Ala Ile Ile Thr Glu Val Val Glu Lys Asp
 115 120 125
 Glu Ile Val Ile Tyr Asn Ser Arg Leu Glu Leu Val Leu Gln Val Val
 130 135 140
 Gly Val Ser Ser Pro Val Leu Ser Phe Leu Val Leu Gln Phe Ala Ser
 145 150 155 160
 Leu His Met Thr Leu Leu Leu Asp Ser Leu Thr Phe Phe Ile Ala Phe
 165 170 175
 Val Leu Val Ala Phe Leu Pro Lys Glu Glu Ala Lys Val Gln Glu Lys
 180 185 190
 Lys Ala Phe Thr Gly Arg Asp Ile Phe Val Asp Ile Lys Asp Gly Leu
 195 200 205
 His Tyr Ile Trp His Gln Gln Glu Ile Phe Phe Leu Leu Leu Val Ala
 210 215 220
 Ser Ser Val Asn Phe Phe Phe Ala Ala Phe Glu Phe Leu Leu Pro Phe
 225 230 235 240
 Ser Asn Gln Leu Tyr Gly Ser Glu Gly Ala Tyr Ala Ser Ile Leu Thr
 245 250 255
 Met Gly Ala Ile Gly Ser Ile Ile Gly Ala Leu Leu Ala Ser Lys Ile
 260 265 270
 Lys Ala Asn Ile Tyr Asn Leu Leu Ile Leu Leu Ala Leu Thr Gly Val
 275 280 285
 Gly Val Phe Met Met Gly Leu Pro Leu Pro Thr Phe Leu Ser Phe Ser
 290 295 300
 Gly Asn Leu Val Cys Glu Leu Phe Met Thr Ile Phe Asn Ile His Phe
 305 310 315 320
 Phe Thr Gln Val Gln Thr Lys Val Glu Ser Glu Phe Leu Gly Arg Val
 325 330 335
 Leu Ser Thr Ile Phe Thr Leu Ala Ile Leu Phe Met Pro Ile Ala Lys
 340 345 350
 Gly Phe Met Thr Val Leu Pro Ser Val His Leu Tyr Ser Phe Leu Ile
 355 360 365
 Ile Gly Leu Gly Val Val Ala Leu Tyr Phe Leu Ala Leu Gly Tyr Val
 370 375 380
 Arg Thr His Phe Glu Lys Leu Ile
 385 390

<210> 121
 <211> 2466
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 121
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 cgataa 2466

<210> 122
 <211> 821
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 122
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Ser Ser Thr Lys Lys Ser Lys Thr Leu Asp Lys Ser Ala Ile Phe Pro	35	40	45
Ala Ile Leu Leu Ser Ile Lys Ala Leu Phe Asn Leu Leu Phe Val Leu	50	55	60
Gly Phe Leu Gly Gly Met Leu Gly Ala Gly Ile Ala Leu Gly Tyr Gly	65	70	75
Val Ala Leu Phe Asp Lys Val Arg Val Pro Gln Thr Glu Glu Leu Val	85	90	95
Asn Gln Val Lys Asp Ile Ser Ser Ile Ser Glu Ile Thr Tyr Ser Asp	100	105	110
Gly Thr Val Ile Ala Ser Ile Glu Ser Asp Leu Leu Arg Thr Ser Ile	115	120	125
Ser Ser Glu Gln Ile Ser Glu Asn Leu Lys Lys Ala Ile Ile Ala Thr	130	135	140
Glu Asp Glu His Phe Lys Glu His Lys Gly Val Val Pro Lys Ala Val	145	150	155
Ile Arg Ala Thr Leu Gly Lys Phe Val Gly Leu Gly Ser Ser Ser Gly	165	170	175
Gly Ser Thr Leu Thr Gln Gln Leu Ile Lys Gln Gln Val Val Gly Asp	180	185	190
Ala Pro Thr Leu Ala Arg Lys Ala Ala Glu Ile Val Asp Ala Leu Ala	195	200	205
Leu Glu Arg Ala Met Asn Lys Asp Glu Ile Leu Thr Thr Tyr Leu Asn	210	215	220
Val Ala Pro Phe Gly Arg Asn Asn Lys Gly Gln Asn Ile Ala Gly Ala	225	230	235
Arg Gln Ala Ala Glu Gly Ile Phe Gly Val Asp Ala Ser Gln Leu Thr	245	250	255
Val Pro Gln Ala Ala Phe Leu Ala Gly Leu Pro Gln Ser Pro Ile Thr	260	265	270
Tyr Ser Pro Tyr Glu Asn Thr Gly Glu Leu Lys Ser Asp Glu Asp Leu	275	280	285
Glu Ile Gly Leu Arg Arg Ala Lys Ala Val Leu Tyr Ser Met Tyr Arg	290	295	300
Thr Gly Ala Leu Ser Lys Asp Glu Tyr Ser Gln Tyr Lys Asp Tyr Asp			

305		310		315		320
Leu Lys Gln Asp	Phe Leu Pro Ser Gly	Thr Val Thr Gly	Ile Ser Arg			
	325		330		335	
Asp Tyr Leu Tyr	Phe Thr Thr Leu Ala	Glu Ala Gln Glu	Arg Met Tyr			
	340	345	350			
Asp Tyr Leu Ala	Gln Arg Asp Asn Val	Ser Ala Lys Glu	Leu Lys Asn			
	355	360	365			
Glu Ala Thr Gln	Lys Phe Tyr Arg Asp	Leu Ala Ala Lys	Glu Ile Glu			
	370	375	380			
Asn Gly Gly Tyr	Lys Ile Thr Thr Thr	Ile Asp Gln Lys	Ile His Ser			
385	390	395	400			
Ala Met Gln Ser	Ala Val Ala Asp Tyr	Gly Tyr Leu Leu	Asp Asp Gly			
	405	410	415			
Thr Gly Arg Val	Glu Val Gly Asn Val	Leu Met Asp Asn	Gln Thr Gly			
	420	425	430			
Ala Ile Leu Gly	Phe Val Gly Gly Arg	Asn Tyr Gln Glu	Asn Gln Asn			
	435	440	445			
Asn His Ala Phe	Asp Thr Lys Arg Ser	Pro Ala Ser Thr	Thr Lys Pro			
	450	455	460			
Leu Leu Ala Tyr	Gly Ile Ala Ile Asp	Gln Gly Leu Met	Gly Ser Glu			
465	470	475	480			
Thr Ile Leu Ser	Asn Tyr Pro Thr Asn	Phe Ala Asn Gly	Asn Pro Ile			
	485	490	495			
Met Tyr Ala Asn	Ser Lys Gly Thr Gly	Met Met Thr Leu	Gly Glu Ala			
	500	505	510			
Leu Asn Tyr Ser	Trp Asn Ile Pro Ala	Tyr Trp Thr Tyr	Arg Met Leu			
	515	520	525			
Arg Glu Lys Gly	Val Asp Val Lys Gly	Tyr Met Glu Lys	Met Gly Tyr			
	530	535	540			
Glu Ile Pro Glu	Tyr Gly Ile Glu Ser	Leu Pro Met Gly	Gly Gly Ile			
545	550	555	560			
Glu Val Thr Val	Ala Gln His Thr Asn	Gly Tyr Gln Thr	Leu Ala Asn			
	565	570	575			
Asn Gly Val Tyr	His Gln Lys His Val	Ile Ser Lys Ile	Glu Ala Ala			
	580	585	590			
Asp Gly Arg Val	Val Tyr Glu Tyr Gln	Asp Lys Pro Val	Gln Val Tyr			
	595	600	605			
Ser Lys Ala Thr	Ala Thr Ile Met Gln	Gly Leu Leu Arg	Glu Val Leu			

610	615	620
Ser Ser Arg Val Thr Thr Thr Phe Lys Ser Asn Leu Thr Ser Leu Asn 625 630 635 640		
Pro Thr Leu Ala Asn Ala Asp Trp Ile Gly Lys Thr Gly Thr Thr Asn 645 650 655		
Gln Asp Glu Asn Met Trp Leu Met Leu Ser Thr Pro Arg Leu Thr Leu 660 665 670		
Gly Gly Trp Ile Gly His Asp Asp Asn His Ser Leu Ser Arg Arg Ala 675 680 685		
Gly Tyr Ser Asn Asn Ser Asn Tyr Met Ala His Leu Val Asn Ala Ile 690 695 700		
Gln Gln Ala Ser Pro Ser Ile Trp Gly Asn Glu Arg Phe Ala Leu Asp 705 710 715 720		
Pro Ser Val Val Lys Ser Glu Val Leu Lys Ser Thr Gly Gln Lys Pro 725 730 735		
Glu Lys Val Ser Val Glu Gly Lys Glu Val Glu Val Thr Gly Ser Thr 740 745 750		
Val Thr Ser Tyr Trp Ala Asn Lys Ser Gly Ala Pro Ala Thr Ser Tyr 755 760 765		
Arg Phe Ala Ile Gly Gly Ser Asp Ala Asp Tyr Gln Asn Ala Trp Ser 770 775 780		
Ser Ile Val Gly Ser Leu Pro Thr Pro Ser Ser Ser Ser Ser Ser 785 790 795 800		
Ser Ser Ser Ser Asp Ser Ser Asn Ser Ser Thr Thr Arg Pro Ser Ser 805 810 815		
Ser Arg Ala Arg Arg 820		

<210> 123

<211> 1974

<212> DNA

<213> Streptococcus pneumoniae

<400> 123

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ctttttgtag gaggctatgt ttttttattt aagaaactga gagtgcatta tacaaggagt 180
gatgtagaac agatacagta tgtaaaccac caagcggaag aaagtttgac agctctattg 240
gaacagatgc ctgtaggtgt tatgaaattg aatttatctt ctggagaggt tgagtgggtt 300
aatccctatg ctgaattgat tttgaccaag gaagatgggt attttgattt agaagctggt 360
caaacgatta tcaaggcttc agtaggaaat ccgtctactt atgccaagct tggtgagaag 420
cgttatgctg ttcatatgga tgcttcttcc ggtgttttgt attttgtaga tgtatccagg 480

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gaacaagcca taacagatga attggttaaca agtagaccag tgattgggat tgtctctgtg 540
 gataattatg atgatttggga ggatgaaact tctgagtcag atattagtca aatcaatagt 600
 tttgtagcta attttatatc agagttttca gaaaaacaca tgatgttttc tcgtcgggta 660
 agtatggatc gattttatct atttactgac tacacgggtgc ttgaggggctt gatgaatgat 720
 aaattttctg ttattgatgc tttcagagaa gagtcgaaac agagacagtt gcccttgacc 780
 ttaagtatgg gattttctta tggcgatgga aatcatgatg agatagggaa agttgctttg 840
 ctcaatttga acttggctga agtacgtggt ggcgaccagg tggttgttaa ggaaaacgac 900
 gaaacgaaaa atccagttta ttttgggtggt gggctctgctg cttcaatcaa gcgtacacgg 960
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 gttaaggatg caatggggat ggtgaccaat cgttctttgt tgattcttgt agaccattca 1260
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 gaccaccata gaagggatca ggattttcca gataatgcgg ttattactta tatcgaaagt 1380
 ggtgcaagta gtgccagtga gttggtaacg gaattgattc agttccagaa ttctaagaaa 1440
 aatcgtttga gtcgtatgca agcaagtgtc ttgatggctg gtatgatgtt ggatactaaa 1500
 aatttcacct cgcgagtaac tagtcggaca tttgatgttg ctagctatct cagaacgcgc 1560
 ggaagtgata gtattgctat ccaggaaatc gctgcgacag attttgaaga atatcgtgag 1620
 gtcaatgaac ttattttaca ggggcgtaaa ttaggttcag atgtactaat agcagaggct 1680
 aaggacatga aatgctatga tacagttggt attagtaagg cagcagatgc catgttagcc 1740
 atgtcaggtg ttgaagcgag ttttgttctt gcgaagaata cacaaggatt tatctctatc 1800
 tcagctcgaa gtcgtagtaa actgaatgta caacggatta tggaagagtt aggcgggtgga 1860
 ggccacttta atttggcagc agctcaaatt aaagatgtaa ccttgtcaga agcaggtgaa 1920
 aaactgcacg aaattgtatt aaatgaaatg aaggaaaagg agaaagaaga atga 1974

<210> 124

<211> 657

<212> PRT

<213> Streptococcus pneumoniae

<400> 124

Met Lys Lys Phe Tyr Val Ser Pro Ile Phe Pro Ile Leu Val Gly Leu
 1 5 10 15

Ile Ala Phe Gly Val Leu Ser Thr Phe Ile Ile Phe Val Asn Asn Asn
 20 25 30

Leu Leu Thr Val Leu Ile Leu Phe Leu Phe Val Gly Gly Tyr Val Phe
 35 40 45

Leu Phe Lys Lys Leu Arg Val His Tyr Thr Arg Ser Asp Val Glu Gln
 50 55 60

Ile Gln Tyr Val Asn His Gln Ala Glu Glu Ser Leu Thr Ala Leu Leu
 65 70 75 80

Glu Gln Met Pro Val Gly Val Met Lys Leu Asn Leu Ser Ser Gly Glu
 85 90 95

Val Glu Trp Phe Asn Pro Tyr Ala Glu Leu Ile Leu Thr Lys Glu Asp
 100 105 110

Gly Asp Phe Asp Leu Glu Ala Val Gln Thr Ile Ile Lys Ala Ser Val
 115 120 125

Gly Asn Pro Ser Thr Tyr Ala Lys Leu Gly Glu Lys Arg Tyr Ala Val
 130 135 140
 His Met Asp Ala Ser Ser Gly Val Leu Tyr Phe Val Asp Val Ser Arg
 145 150 155 160
 Glu Gln Ala Ile Thr Asp Glu Leu Val Thr Ser Arg Pro Val Ile Gly
 165 170 175
 Ile Val Ser Val Asp Asn Tyr Asp Asp Leu Glu Asp Glu Thr Ser Glu
 180 185 190
 Ser Asp Ile Ser Gln Ile Asn Ser Phe Val Ala Asn Phe Ile Ser Glu
 195 200 205
 Phe Ser Glu Lys His Met Met Phe Ser Arg Arg Val Ser Met Asp Arg
 210 215 220
 Phe Tyr Leu Phe Thr Asp Tyr Thr Val Leu Glu Gly Leu Met Asn Asp
 225 230 235 240
 Lys Phe Ser Val Ile Asp Ala Phe Arg Glu Glu Ser Lys Gln Arg Gln
 245 250 255
 Leu Pro Leu Thr Leu Ser Met Gly Phe Ser Tyr Gly Asp Gly Asn His
 260 265 270
 Asp Glu Ile Gly Lys Val Ala Leu Leu Asn Leu Asn Leu Ala Glu Val
 275 280 285
 Arg Gly Gly Asp Gln Val Val Val Lys Glu Asn Asp Glu Thr Lys Asn
 290 295 300
 Pro Val Tyr Phe Gly Gly Gly Ser Ala Ala Ser Ile Lys Arg Thr Arg
 305 310 315 320
 Thr Arg Thr Arg Ala Met Met Thr Ala Ile Ser Asp Lys Ile Arg Ser
 325 330 335
 Val Asp Gln Val Phe Val Val Gly His Lys Asn Leu Asp Met Asp Ala
 340 345 350
 Leu Gly Ser Ala Val Gly Met Gln Leu Phe Ala Ser Asn Val Ile Glu
 355 360 365
 Asn Ser Tyr Ala Leu Tyr Asp Glu Glu Gln Met Ser Pro Asp Ile Glu
 370 375 380
 Arg Ala Val Ser Phe Ile Glu Lys Glu Gly Val Thr Lys Leu Leu Ser
 385 390 395 400
 Val Lys Asp Ala Met Gly Met Val Thr Asn Arg Ser Leu Leu Ile Leu
 405 410 415
 Val Asp His Ser Lys Thr Ala Leu Thr Leu Ser Lys Glu Phe Tyr Asp
 420 425 430

Leu Phe Thr Gln Thr Ile Val Ile Asp His His Arg Arg Asp Gln Asp
 435 440 445
 Phe Pro Asp Asn Ala Val Ile Thr Tyr Ile Glu Ser Gly Ala Ser Ser
 450 455 460
 Ala Ser Glu Leu Val Thr Glu Leu Ile Gln Phe Gln Asn Ser Lys Lys
 465 470 475 480
 Asn Arg Leu Ser Arg Met Gln Ala Ser Val Leu Met Ala Gly Met Met
 485 490 495
 Leu Asp Thr Lys Asn Phe Thr Ser Arg Val Thr Ser Arg Thr Phe Asp
 500 505 510
 Val Ala Ser Tyr Leu Arg Thr Arg Gly Ser Asp Ser Ile Ala Ile Gln
 515 520 525
 Glu Ile Ala Ala Thr Asp Phe Glu Glu Tyr Arg Glu Val Asn Glu Leu
 530 535 540
 Ile Leu Gln Gly Arg Lys Leu Gly Ser Asp Val Leu Ile Ala Glu Ala
 545 550 555 560
 Lys Asp Met Lys Cys Tyr Asp Thr Val Val Ile Ser Lys Ala Ala Asp
 565 570 575
 Ala Met Leu Ala Met Ser Gly Ile Glu Ala Ser Phe Val Leu Ala Lys
 580 585 590
 Asn Thr Gln Gly Phe Ile Ser Ile Ser Ala Arg Ser Arg Ser Lys Leu
 595 600 605
 Asn Val Gln Arg Ile Met Glu Glu Leu Gly Gly Gly Gly His Phe Asn
 610 615 620
 Leu Ala Ala Ala Gln Ile Lys Asp Val Thr Leu Ser Glu Ala Gly Glu
 625 630 635 640
 Lys Leu Thr Glu Ile Val Leu Asn Glu Met Lys Glu Lys Glu Lys Glu
 645 650 655

Glu

<210> 125
 <211> 663
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 125
 atgaagtgct tggtatgtgg gcagactatg aagactgttt taacttttag tagtctotta 60
 cttctgagga atgatgactc ttgtctttgt tcagactgtg attctacttt tgaaagaatt 120
 ggggaagaga actgtccaaa ttgtatgaaa acagagttgt caacaaagtg tcaagattgt 180
 caactttggt gtaaagaggg agttgaagtc agtcatagag cgatttttac ttacaatcaa 240

gctatgaagg atttttttcag tCGgtataag tttgatggag acttcctggt aagaaaagtt 300
 ttCGcttcat ttttaagtga ggagttgaaa aagtacaaaag agtatcaatt tgttgtaatt 360
 cccctaagtc ctgatatagata tgctaataga ggatttaatc aggttgaggg cttggtagag 420
 gcagcaggct ttgagtatct ggatttatta gagaaaagag aagagagagc cagttcttct 480
 aaaaatcggt cagagcgctt ggggacagaa cttcctttct ttattaaaag tggagtcact 540
 attcctaaaa aaatcctact tatagatgat atctatacta caggagcaac tataaatcgt 600
 gttaagaaac tgttggaaga agctgggtgct aaggatgtaa aaacattttc ccttgtaaga 660
 tga 663

<210> 126

<211> 220

<212> PRT

<213> Streptococcus pneumoniae

<400> 126

Met Lys Cys Leu Leu Cys Gly Gln Thr Met Lys Thr Val Leu Thr Phe
 1 5 10 15

Ser Ser Leu Leu Leu Arg Asn Asp Asp Ser Cys Leu Cys Ser Asp
 20 25 30

Cys Asp Ser Thr Phe Glu Arg Ile Gly Glu Glu Asn Cys Pro Asn Cys
 35 40 45

Met Lys Thr Glu Leu Ser Thr Lys Cys Gln Asp Cys Gln Leu Trp Cys
 50 55 60

Lys Glu Gly Val Glu Val Ser His Arg Ala Ile Phe Thr Tyr Asn Gln
 65 70 75 80

Ala Met Lys Asp Phe Phe Ser Arg Tyr Lys Phe Asp Gly Asp Phe Leu
 85 90 95

Leu Arg Lys Val Phe Ala Ser Phe Leu Ser Glu Glu Leu Lys Lys Tyr
 100 105 110

Lys Glu Tyr Gln Phe Val Val Ile Pro Leu Ser Pro Asp Arg Tyr Ala
 115 120 125

Asn Arg Gly Phe Asn Gln Val Glu Gly Leu Val Glu Ala Ala Gly Phe
 130 135 140

Glu Tyr Leu Asp Leu Leu Glu Lys Arg Glu Glu Arg Ala Ser Ser Ser
 145 150 155 160

Lys Asn Arg Ser Glu Arg Leu Gly Thr Glu Leu Pro Phe Phe Ile Lys
 165 170 175

Ser Gly Val Thr Ile Pro Lys Lys Ile Leu Leu Ile Asp Asp Ile Tyr
 180 185 190

Thr Thr Gly Ala Thr Ile Asn Arg Val Lys Lys Leu Leu Glu Glu Ala
 195 200 205

Gly Ala Lys Asp Val Lys Thr Phe Ser Leu Val Arg
 210 215 220

<210> 127
 <211> 1299
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 127
 atgaaagtaa atttagatta tctcgggtcgt ttattttactg agaatgaatt aacagaagaa 60
 gaacgtcagt tggcggagaa acttccagca atgagaaagg agaaggggaa acttttctgt 120
 caacgctgta atagtactat tctagaagaa tgggtatttgc ccatcgggtgc ttactattgt 180
 cgagagtgtc tgctgatgaa gcgagtcaga agtgatcaaa ctttatacta ttttccgcag 240
 gaggattttc caaagcaaga tgttctcaaa tggcgcggcc aattaactcc ttttcaagag 300
 aagggtgtcag agggattgtc tcaagtagta gacaagcaaa agccaacctt agttcatgcg 360
 gtaacaggag ctggaaagac agaaatgatt tatcaagtag tggctaaagt gatcaatgcg 420
 ggtggtgtag tgtgtttggc tagtcctcgc atagatgttt gtttggagct gtacaagcgc 480
 ctgcaacagg atttttcttg cgggatagct ttgctacatg gagaatcggg accttatttt 540
 cgaacaccac tagttgttgc aacaacccat cagttattga agttttatca agcttttgat 600
 ttgctgatag tggatgaagt agatgctttt ccttatgttg ataatcccat gctttaccac 660
 gctgtcaaga atagtgtaaa ggagaatgga ttgagaatct ttttaacagc gacttcgacc 720
 aatgagttag ataaaaaggt ccgttttaga gaactaaaaa gactgaattt accgagacgg 780
 tttcatggaa atccgttgat tattccaaaa ccaatttggg tatcggattt taatcgctac 840
 ttagacaaga atcgtttgtc accaaagtta aagtcctata ttgagaagca gagaaagaca 900
 gcttatccgt tactcatttt tgcttcagaa attaagaaaag gggagcagtt agcagaaatc 960
 ttacaggagc aatttccaaa tgagaaaatt ggctttgtat cttctgtaac agaggatcga 1020
 ttagagcaag tacaagcttt tcgagatgga gaactgacaa tacttatcag tacgacaatc 1080
 ttggagcgcg gagttacctt cccttggttg gatgttttcg tagtagaggc caatcatcgt 1140
 ttgtttacca agtctagttt gattcagatt ggtggacgag ttggacgaag catggataga 1200
 ccgacaggag atttgctttt cttccatgat gggttaaatg cttcaatcaa gaaggcgatt 1260
 aaggaaattc agatgatgaa taaggaggct ggtctatga 1299

<210> 128
 <211> 432
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 128
 Met Lys Val Asn Leu Asp Tyr Leu Gly Arg Leu Phe Thr Glu Asn Glu
 1 5 10 15
 Leu Thr Glu Glu Glu Arg Gln Leu Ala Glu Lys Leu Pro Ala Met Arg
 20 25 30
 Lys Glu Lys Gly Lys Leu Phe Cys Gln Arg Cys Asn Ser Thr Ile Leu
 35 40 45
 Glu Glu Trp Tyr Leu Pro Ile Gly Ala Tyr Tyr Cys Arg Glu Cys Leu
 50 55 60
 Leu Met Lys Arg Val Arg Ser Asp Gln Thr Leu Tyr Tyr Phe Pro Gln
 65 70 75 80
 Glu Asp Phe Pro Lys Gln Asp Val Leu Lys Trp Arg Gly Gln Leu Thr
 85 90 95

Pro Phe Gln Glu Lys Val Ser Glu Gly Leu Leu Gln Val Val Asp Lys
 100 105 110
 Gln Lys Pro Thr Leu Val His Ala Val Thr Gly Ala Gly Lys Thr Glu
 115 120 125
 Met Ile Tyr Gln Val Val Ala Lys Val Ile Asn Ala Gly Gly Ala Val
 130 135 140
 Cys Leu Ala Ser Pro Arg Ile Asp Val Cys Leu Glu Leu Tyr Lys Arg
 145 150 155 160
 Leu Gln Gln Asp Phe Ser Cys Gly Ile Ala Leu Leu His Gly Glu Ser
 165 170 175
 Glu Pro Tyr Phe Arg Thr Pro Leu Val Val Ala Thr Thr His Gln Leu
 180 185 190
 Leu Lys Phe Tyr Gln Ala Phe Asp Leu Leu Ile Val Asp Glu Val Asp
 195 200 205
 Ala Phe Pro Tyr Val Asp Asn Pro Met Leu Tyr His Ala Val Lys Asn
 210 215 220
 Ser Val Lys Glu Asn Gly Leu Arg Ile Phe Leu Thr Ala Thr Ser Thr
 225 230 235 240
 Asn Glu Leu Asp Lys Lys Val Arg Leu Gly Glu Leu Lys Arg Leu Asn
 245 250 255
 Leu Pro Arg Arg Phe His Gly Asn Pro Leu Ile Ile Pro Lys Pro Ile
 260 265 270
 Trp Leu Ser Asp Phe Asn Arg Tyr Leu Asp Lys Asn Arg Leu Ser Pro
 275 280 285
 Lys Leu Lys Ser Tyr Ile Glu Lys Gln Arg Lys Thr Ala Tyr Pro Leu
 290 295 300
 Leu Ile Phe Ala Ser Glu Ile Lys Lys Gly Glu Gln Leu Ala Glu Ile
 305 310 315 320
 Leu Gln Glu Gln Phe Pro Asn Glu Lys Ile Gly Phe Val Ser Ser Val
 325 330 335
 Thr Glu Asp Arg Leu Glu Gln Val Gln Ala Phe Arg Asp Gly Glu Leu
 340 345 350
 Thr Ile Leu Ile Ser Thr Thr Ile Leu Glu Arg Gly Val Thr Phe Pro
 355 360 365
 Cys Val Asp Val Phe Val Val Glu Ala Asn His Arg Leu Phe Thr Lys
 370 375 380
 Ser Ser Leu Ile Gln Ile Gly Gly Arg Val Gly Arg Ser Met Asp Arg
 385 390 395 400

Pro Thr Gly Asp Leu Leu Phe Phe His Asp Gly Leu Asn Ala Ser Ile
405 410 415

Lys Lys Ala Ile Lys Glu Ile Gln Met Met Asn Lys Glu Ala Gly Leu
420 425 430

<210> 129

<211> 870

<212> DNA

<213> Streptococcus pneumoniae

<400> 129

atgcaaattc aaaaaagttt taaggggcag tctccctatg gcaagctgta tctagtggca 60
acgccgattg gcaatctaga tgatatgact tttcgtgcta tccagacctt gaaagaagtg 120
gactggattg ctgctgagga tacgcgcaat acagggcgtt tgctcaagca ttttgacatt 180
tccaccaagc agatcagttt tcatgagcac aatgccaagg aaaaaattcc tgatttgatt 240
ggtttcttga aagcagggca aagtattgct caggtctctg atgccggttt gcctagcatt 300
tcagaccctg gtcattgatt agttaaggca gctattgagg aagaaattgc agttgtgaca 360
gttccaggtg cctctgcagg aatttctgcc ttgattgcca gtggtttagc gccacagcca 420
catatctttt acgggttttt accgagaaaa tcaggtcagc agaagcaatt ttttggcttg 480
aaaaaagatt atcctgaaac acagattttt tatgaatcac ctcacgtgt agcagacacg 540
ttggaaaata tgtagaagt ctacggtgac cgctccgttg tcttggtcag ggaattgacc 600
aaaatctatg aagaatacca acgaggtact atctctgagt tattagaaag cattgctgaa 660
acgccactca agggcgaatg tcttctcatt gttgaggggtg ccagtcaggg tgtggaggaa 720
aaggacgagg aagacttggt cgtagaaatt caaacccgca tccagcaagg tgtgaagaaa 780
aaccaagcta tcaaggaagt cgctaagatt taccagtga ataaaagtca gctctacgct 840
gcctaccacg actgggaaga aaaacaataa 870

<210> 130

<211> 289

<212> PRT

<213> Streptococcus pneumoniae

<400> 130

Met Gln Ile Gln Lys Ser Phe Lys Gly Gln Ser Pro Tyr Gly Lys Leu
1 5 10 15

Tyr Leu Val Ala Thr Pro Ile Gly Asn Leu Asp Asp Met Thr Phe Arg
20 25 30

Ala Ile Gln Thr Leu Lys Glu Val Asp Trp Ile Ala Ala Glu Asp Thr
35 40 45

Arg Asn Thr Gly Leu Leu Lys His Phe Asp Ile Ser Thr Lys Gln
50 55 60

Ile Ser Phe His Glu His Asn Ala Lys Glu Lys Ile Pro Asp Leu Ile
65 70 75 80

Gly Phe Leu Lys Ala Gly Gln Ser Ile Ala Gln Val Ser Asp Ala Gly
85 90 95

Leu Pro Ser Ile Ser Asp Pro Gly His Asp Leu Val Lys Ala Ala Ile
 100 105 110
 Glu Glu Glu Ile Ala Val Val Thr Val Pro Gly Ala Ser Ala Gly Ile
 115 120 125
 Ser Ala Leu Ile Ala Ser Gly Leu Ala Pro Gln Pro His Ile Phe Tyr
 130 135 140
 Gly Phe Leu Pro Arg Lys Ser Gly Gln Gln Lys Gln Phe Phe Gly Leu
 145 150 155 160
 Lys Lys Asp Tyr Pro Glu Thr Gln Ile Phe Tyr Glu Ser Pro His Arg
 165 170 175
 Val Ala Asp Thr Leu Glu Asn Met Leu Glu Val Tyr Gly Asp Arg Ser
 180 185 190
 Val Val Leu Val Arg Glu Leu Thr Lys Ile Tyr Glu Glu Tyr Gln Arg
 195 200 205
 Gly Thr Ile Ser Glu Leu Leu Glu Ser Ile Ala Glu Thr Pro Leu Lys
 210 215 220
 Gly Glu Cys Leu Leu Ile Val Glu Gly Ala Ser Gln Gly Val Glu Glu
 225 230 235 240
 Lys Asp Glu Glu Asp Leu Phe Val Glu Ile Gln Thr Arg Ile Gln Gln
 245 250 255
 Gly Val Lys Lys Asn Gln Ala Ile Lys Glu Val Ala Lys Ile Tyr Gln
 260 265 270
 Trp Asn Lys Ser Gln Leu Tyr Ala Ala Tyr His Asp Trp Glu Glu Lys
 275 280 285

Gln

<210> 131
 <211> 345
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 131
 atgataaaga aaggaaaggg ctgttttatg gacaaaaaag aattatttga cgcgctggat 60
 gatttttccc aacaattatt ggtaacctta gccgatgtgg aagccatcaa gaaaaatctc 120
 aagagcctgg tagaggaaaa tacagctctt cgcttggaag atagtaagtt gcgagaacgc 180
 ttgggtgagg tggaagcaga tgctcctgtc aaggccaagc atgttcgcga aagtgtccgt 240
 cgtatttacc gtgatggatt tcacgtatgt aatgattttt atggacaacg tcgagagcag 300
 gacgaagaat gtatgttttg tgacgagttg ttatacaggg agtaa 345

<210> 132

<211> 114
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 132
 Met Ile Lys Lys Gly Lys Gly Cys Phe Met Asp Lys Lys Glu Leu Phe
 1 5 10 15
 Asp Ala Leu Asp Asp Phe Ser Gln Gln Leu Leu Val Thr Leu Ala Asp
 20 25 30
 Val Glu Ala Ile Lys Lys Asn Leu Lys Ser Leu Val Glu Glu Asn Thr
 35 40 45
 Ala Leu Arg Leu Glu Asn Ser Lys Leu Arg Glu Arg Leu Gly Glu Val
 50 55 60
 Glu Ala Asp Ala Pro Val Lys Ala Lys His Val Arg Glu Ser Val Arg
 65 70 75 80
 Arg Ile Tyr Arg Asp Gly Phe His Val Cys Asn Asp Phe Tyr Gly Gln
 85 90 95
 Arg Arg Glu Gln Asp Glu Glu Cys Met Phe Cys Asp Glu Leu Leu Tyr
 100 105 110
 Arg Glu

<210> 133
 <211> 639
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 133
 atgtcaaaag gatttttagt ctctcttgag ggaccagagg gagcaggcaa gaccagtgtt 60
 ttagaggctc tgctaccaat tttagaggaa aaaggagtag aggtgttgac gaccctgaa 120
 cctggcggag tcttgattgg ggagaagatt cgggaagtga ttttggatcc aagtcatact 180
 cagatggatg ctaaaacaga gctacttctc tatattgcca gtcgcagaca gcatttggtg 240
 gaaaaagttc ttccagccct tgaagctggc aagttgggtc tcatggatcg ttttatcgat 300
 agttctgttg cctatcaggg atttggtcgt ggcttagata ttgaagccat tgactggctc 360
 aatcagtttg cgacagatgg cctcaaaccg gatttgacac tctattttga catcgagggtg 420
 gaagaagggc tggctcgat tgctgctaag agtgaccgag aggttaatcg tttggatttg 480
 gaagggttgg acttgcataa aaaagttcgt caaggctacc tttctcttct ggataaagag 540
 ggaaatcgca ttgtcaagat tgatgctagt ctccctttgg agcaagttgt ggaaactacc 600
 aaggctgtct tgtttgacgg aatgggcttg gccaaatga 639

<210> 134
 <211> 212
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 134
 Met Ser Lys Gly Phe Leu Val Ser Leu Glu Gly Pro Glu Gly Ala Gly

1	5	10	15
Lys Thr Ser Val Leu Glu Ala Leu Leu Pro Ile Leu Glu Glu Lys Gly	20	25	30
Val Glu Val Leu Thr Thr Arg Glu Pro Gly Gly Val Leu Ile Gly Glu	35	40	45
Lys Ile Arg Glu Val Ile Leu Asp Pro Ser His Thr Gln Met Asp Ala	50	55	60
Lys Thr Glu Leu Leu Leu Tyr Ile Ala Ser Arg Arg Gln His Leu Val	65	70	75
Glu Lys Val Leu Pro Ala Leu Glu Ala Gly Lys Leu Val Ile Met Asp	85	90	95
Arg Phe Ile Asp Ser Ser Val Ala Tyr Gln Gly Phe Gly Arg Gly Leu	100	105	110
Asp Ile Glu Ala Ile Asp Trp Leu Asn Gln Phe Ala Thr Asp Gly Leu	115	120	125
Lys Pro Asp Leu Thr Leu Tyr Phe Asp Ile Glu Val Glu Glu Gly Leu	130	135	140
Ala Arg Ile Ala Ala Asn Ser Asp Arg Glu Val Asn Arg Leu Asp Leu	145	150	155
Glu Gly Leu Asp Leu His Lys Lys Val Arg Gln Gly Tyr Leu Ser Leu	165	170	175
Leu Asp Lys Glu Gly Asn Arg Ile Val Lys Ile Asp Ala Ser Leu Pro	180	185	190
Leu Glu Gln Val Val Glu Thr Thr Lys Ala Val Leu Phe Asp Gly Met	195	200	205
Gly Leu Ala Lys	210		

<210> 135

<211> 474

<212> DNA

<213> Streptococcus pneumoniae

<400> 135

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atggtagaac aaagaaaatc aattaccatg aaagatgttg ctttagaagc aggagttagt 60
gttggaactg ttccacgtgt aattaataaa gaaaaaggca ttaaagaagt aactttgaaa 120
aaagtgaac aagcgattaa aactttgaat tacattccag attactacgc tagaggaatg 180
aaaaaaaaatc gaacagaaac gattgcaatc attgtaccaa gtatctggca tcccttcttt 240
tcagaatttg ctatgcatgt ggaaaatgaa gtctataaga gaaataacaa attactctta 300
tggttctatca atggtacaaa tagagagcaa gactatctgg agatgttgcg tcataataaa 360
gttgatggag tgggtgccat tacctatagg ccaattgaac attacttgac gtcaggaatt 420
cccttgttta gtattgaccg cacatactca gagattgccca ttccttgtgt ttca 474

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<210> 136
 <211> 158
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 136
 Met Val Glu Gln Arg Lys Ser Ile Thr Met Lys Asp Val Ala Leu Glu
 1 5 10 15
 Ala Gly Val Ser Val Gly Thr Val Ser Arg Val Ile Asn Lys Glu Lys
 20 25 30
 Gly Ile Lys Glu Val Thr Leu Lys Lys Val Glu Gln Ala Ile Lys Thr
 35 40 45
 Leu Asn Tyr Ile Pro Asp Tyr Tyr Ala Arg Gly Met Lys Lys Asn Arg
 50 55 60
 Thr Glu Thr Ile Ala Ile Ile Val Pro Ser Ile Trp His Pro Phe Phe
 65 70 75 80
 Ser Glu Phe Ala Met His Val Glu Asn Glu Val Tyr Lys Arg Asn Asn
 85 90 95
 Lys Leu Leu Leu Cys Ser Ile Asn Gly Thr Asn Arg Glu Gln Asp Tyr
 100 105 110
 Leu Glu Met Leu Arg His Asn Lys Val Asp Gly Val Val Ala Ile Thr
 115 120 125
 Tyr Arg Pro Ile Glu His Tyr Leu Thr Ser Gly Ile Pro Phe Val Ser
 130 135 140
 Ile Asp Arg Thr Tyr Ser Glu Ile Ala Ile Pro Cys Val Ser
 145 150 155

<210> 137
 <211> 374
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 137
 atgaatatat ttagaacaaa gaatgtagt ttagataaaa cagagatgca taggcatttg 60
 aagttatggg atttgatttt gctgggtatc ggagccatgg tagggacagg cgtctttaca 120
 atcacaggta ctgcagctgc aacacttgct ggcccagccc tagtgatttc aatcgttatt 180
 tctgccttgt gtgtgggatt atcagccctc ttttttgcag aatttgctc gcgagtaccc 240
 gctacaggag gtgcctatag ttacctctat gctatcttag gagaattccc tgctgggttg 300
 gctggttggg taacctgat ggagttcatg acagccatat caggcgtagc ttcgggttg 360
 gcagcttatt ttaa 374

<210> 138
 <211> 124

<212> PRT

<213> Streptococcus pneumoniae

<400> 138

Met Asn Ile Phe Arg Thr Lys Asn Val Ser Leu Asp Lys Thr Glu Met
1 5 10 15

His Arg His Leu Lys Leu Trp Asp Leu Ile Leu Leu Gly Ile Gly Ala
20 25 30

Met Val Gly Thr Gly Val Phe Thr Ile Thr Gly Thr Ala Ala Ala Thr
35 40 45

Leu Ala Gly Pro Ala Leu Val Ile Ser Ile Val Ile Ser Ala Leu Cys
50 55 60

Val Gly Leu Ser Ala Leu Phe Phe Ala Glu Phe Ala Ser Arg Val Pro
65 70 75 80

Ala Thr Gly Gly Ala Tyr Ser Tyr Leu Tyr Ala Ile Leu Gly Glu Phe
85 90 95

Pro Ala Trp Leu Ala Gly Trp Leu Thr Met Met Glu Phe Met Thr Ala
100 105 110

Ile Ser Gly Val Ala Ser Gly Trp Ala Ala Tyr Phe
115 120

<210> 139

<211> 1311

<212> DNA

<213> Streptococcus pneumoniae

<400> 139

atgaaatcaa gagtaaagga aacgagtatg gataaaattg tggttcaagg tggcgataat 60
cgtctggtag gaagcgtgac gatcgaggga gcaaaaaatg cagtcctacc cttggtggca 120
gcgactattc tagcaagtga aggaaagacc gtcttgacaga atgttccgat tttgtcggat 180
gtctttatta tgaatcaggt agttggtggt ttgaatgcca aggttgactt tgatgaggaa 240
gctcatcttg tcaaggtgga tgctactggc gacatcactg aggaagcccc ttacaagtat 300
gtcagcaaga tgcgcgcctc catcggttga ttagggccaa tccttgcccc tgtgggtcat 360
gccaaggtat ccatgccagg tggttgtacg attggtagcc gtcctattga tcttcatttg 420
aaaggtctgg aagctatggg ggttaagatt agtcagacag ctggttacat cgaagccaag 480
gcagaacgct tgcattggtc tcatatctat atggactttc caagtgttgg tgcaacgcag 540
aacttgatga tggcagcgac tctggctgat ggggtgacag tgattgagaa tgctgcgcgt 600
gagcctgaga ttgttgactt agccattctc cttaatgaaa tgggagccaa ggtcaaagggt 660
gctggtacag agactataac cattactggt gttgagaaac ttcattggtac gactcacaat 720
gtagtccaag accgtatcga agcaggaacc tttatggtag ctgctgccat gactggtggt 780
gatgtcttga ttcgagacgc tgtctgggag cacaaccgtc ccttgattgc caagttactt 840
gaaatgggtg ttgaagtaat tgaagaagac gaaggaattc gtgttcgttc tcaactagaa 900
aatctaaaag ctgttcatgt gaaaaccttg cccacccag gatttccaac agatatgcag 960
gctcaattta cagccttgat gacagttgca aaaggcgaat caaccatggt ggagacagtt 1020
ttcgaaaatc gtttccaaca cctagaagag atgcgccgca tgggcttgca ttctgagatt 1080
atccgtgata cagctcgtat tgttggtgga cagcctttgc agggagcaga agttctttca 1140
actgaccttc gtgccagtgc ggccttgatt ttgacaggtt tggtagcaca gggagaaact 1200
gtggtcggta aattggttca cttggataga ggttactacg gtttccatga gaagttggcg 1260

cagctaggtg ctaagattca gcggattgag gcaagtgatg aagatgaata a

1311

<210> 140

<211> 436

<212> PRT

<213> Streptococcus pneumoniae

<400> 140

Met Lys Ser Arg Val Lys Glu Thr Ser Met Asp Lys Ile Val Val Gln
1 5 10 15

Gly Gly Asp Asn Arg Leu Val Gly Ser Val Thr Ile Glu Gly Ala Lys
20 25 30

Asn Ala Val Leu Pro Leu Leu Ala Ala Thr Ile Leu Ala Ser Glu Gly
35 40 45

Lys Thr Val Leu Gln Asn Val Pro Ile Leu Ser Asp Val Phe Ile Met
50 55 60

Asn Gln Val Val Gly Gly Leu Asn Ala Lys Val Asp Phe Asp Glu Glu
65 70 75 80

Ala His Leu Val Lys Val Asp Ala Thr Gly Asp Ile Thr Glu Glu Ala
85 90 95

Pro Tyr Lys Tyr Val Ser Lys Met Arg Ala Ser Ile Val Val Leu Gly
100 105 110

Pro Ile Leu Ala Arg Val Gly His Ala Lys Val Ser Met Pro Gly Gly
115 120 125

Cys Thr Ile Gly Ser Arg Pro Ile Asp Leu His Leu Lys Gly Leu Glu
130 135 140

Ala Met Gly Val Lys Ile Ser Gln Thr Ala Gly Tyr Ile Glu Ala Lys
145 150 155 160

Ala Glu Arg Leu His Gly Ala His Ile Tyr Met Asp Phe Pro Ser Val
165 170 175

Gly Ala Thr Gln Asn Leu Met Met Ala Ala Thr Leu Ala Asp Gly Val
180 185 190

Thr Val Ile Glu Asn Ala Ala Arg Glu Pro Glu Ile Val Asp Leu Ala
195 200 205

Ile Leu Leu Asn Glu Met Gly Ala Lys Val Lys Gly Ala Gly Thr Glu
210 215 220

Thr Ile Thr Ile Thr Gly Val Glu Lys Leu His Gly Thr Thr His Asn
225 230 235 240

Val Val Gln Asp Arg Ile Glu Ala Gly Thr Phe Met Val Ala Ala Ala
245 250 255

Met Thr Gly Gly Asp Val Leu Ile Arg Asp Ala Val Trp Glu His Asn
 260 265 270
 Arg Pro Leu Ile Ala Lys Leu Leu Glu Met Gly Val Glu Val Ile Glu
 275 280 285
 Glu Asp Glu Gly Ile Arg Val Arg Ser Gln Leu Glu Asn Leu Lys Ala
 290 295 300
 Val His Val Lys Thr Leu Pro His Pro Gly Phe Pro Thr Asp Met Gln
 305 310 315 320
 Ala Gln Phe Thr Ala Leu Met Thr Val Ala Lys Gly Glu Ser Thr Met
 325 330 335
 Val Glu Thr Val Phe Glu Asn Arg Phe Gln His Leu Glu Glu Met Arg
 340 345 350
 Arg Met Gly Leu His Ser Glu Ile Ile Arg Asp Thr Ala Arg Ile Val
 355 360 365
 Gly Gly Gln Pro Leu Gln Gly Ala Glu Val Leu Ser Thr Asp Leu Arg
 370 375 380
 Ala Ser Ala Ala Leu Ile Leu Thr Gly Leu Val Ala Gln Gly Glu Thr
 385 390 395 400
 Val Val Gly Lys Leu Val His Leu Asp Arg Gly Tyr Tyr Gly Phe His
 405 410 415
 Glu Lys Leu Ala Gln Leu Gly Ala Lys Ile Gln Arg Ile Glu Ala Ser
 420 425 430
 Asp Glu Asp Glu
 435

<210> 141

<211> 1100

<212> DNA

<213> Streptococcus pneumoniae

<400> 141

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 aacaaaacaa gttataccgt acagtatggt gatactttga gcaccattgc agaagccttg 180
 ggtgtagatg tcacagtgtg tgcgaaatctg aacaaaatca ctaatatgga cttgattttc 240
 ccagaaaactg ttttgacaac gactgtcaat gaagcagaag aagtaacaga agttgaaatc 300
 caaacacctc aagcagactc tagtgaagaa gtgacaactg cgacagcaga ttgaccact 360
 aatcaagtga ccgttgatga tcaaactggt caggttgacg acctttctca accaattgca 420
 gaagttacaa agacagtgat tgcttctgaa gaagtggcac catctacggg cacttctgtc 480
 ccagaggagc aaacgaccga aacaactcgc ccagttgcag aagaagctcc tcaggaaacg 540
 actccagctg agaagcagga aacacaaaca agccctcaag ctgcatcagc agtggaagca 600
 actacaacaa gttcagaagc aaaagaagta gcatcatcaa atggagctac agcagcagtt 660
 tctacttatc aaccagaaga aacgaaagta atttcaacaa cttacgaggc tccagctgcg 720
 cccgattatg ctggacttgc agtagcaaaa tctgaaaatg caggtcttca accacaaaca 780

gctgccttta agaagaaatt gctaacttgt ttggcattac atccttttagt gggtatcgtc 840
caggagacag tggagatcac ggaaaagggt ttggctatcga ctttatggta ccagaacggt 900
cagaattagg ggataagatt gcggaatatg ctattcaaaa tatggccagc cgtggcatta 960
gttacatcat ctggaaacaa cgtttctatg ctccattcga tagcaaatat gggccagcta 1020
acacttgga cccaatgcca gaccgtggta gtgtgacaga aaatcactat gatcacgttc 1080
acgtttcaat gaatggataa 1100

<210> 142

<211> 302

<212> PRT

<213> Streptococcus pneumoniae

<400> 142

Met Leu Leu Ala Ser Thr Val Ala Leu Ser Phe Ala Pro Val Leu Ala
1 5 10 15

Thr Gln Ala Glu Glu Val Leu Trp Thr Ala Arg Ser Val Glu Gln Ile
20 25 30

Gln Asn Asp Leu Thr Lys Thr Asp Asn Lys Thr Ser Tyr Thr Val Gln
35 40 45

Tyr Gly Asp Thr Leu Ser Thr Ile Ala Glu Ala Leu Gly Val Asp Val
50 55 60

Thr Val Leu Ala Asn Leu Asn Lys Ile Thr Asn Met Asp Leu Ile Phe
65 70 75 80

Pro Glu Thr Val Leu Thr Thr Thr Val Asn Glu Ala Glu Glu Val Thr
85 90 95

Glu Val Glu Ile Gln Thr Pro Gln Ala Asp Ser Ser Glu Glu Val Thr
100 105 110

Thr Ala Thr Ala Asp Leu Thr Thr Asn Gln Val Thr Val Asp Asp Gln
115 120 125

Thr Val Gln Val Ala Asp Leu Ser Gln Pro Ile Ala Glu Val Thr Lys
130 135 140

Thr Val Ile Ala Ser Glu Glu Val Ala Pro Ser Thr Gly Thr Ser Val
145 150 155 160

Pro Glu Glu Gln Thr Thr Glu Thr Thr Arg Pro Val Ala Glu Glu Ala
165 170 175

Pro Gln Glu Thr Thr Pro Ala Glu Lys Gln Glu Thr Gln Thr Ser Pro
180 185 190

Gln Ala Ala Ser Ala Val Glu Ala Thr Thr Thr Ser Ser Glu Ala Lys
195 200 205

Glu Val Ala Ser Ser Asn Gly Ala Thr Ala Ala Val Ser Thr Tyr Gln

210	215	220
Pro Glu Glu Thr Lys Val Ile Ser Thr Thr Tyr Glu Ala Pro Ala Ala		
225	230	235 240
Pro Asp Tyr Ala Gly Leu Ala Val Ala Lys Ser Glu Asn Ala Gly Leu		
	245	250 255
Gln Pro Gln Thr Ala Ala Phe Lys Lys Lys Leu Leu Thr Cys Leu Ala		
	260	265 270
Leu His Pro Leu Val Val Ile Val Gln Glu Thr Val Glu Ile Thr Glu		
	275	280 285
Lys Val Trp Leu Ser Thr Leu Trp Tyr Gln Asn Val Gln Asn		
	290	295 300

<210> 143
 <211> 1281
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 143

ttgtttaaga	aaaataaaga	cattcttaat	attgcattgc	cagctatggg	tgaaaacttt	60
ttgcagatgc	taatgggaat	ggtggacagt	tatttggttg	ctcatttagg	attgatagct	120
atttcagggg	tttcagtagc	tggtaatatt	atcaccattt	atcaggcgat	tttcatcgct	180
ctgggagctg	ctatttccag	tgttatttca	aaaagcatag	ggcagaaaga	ccagtcgaag	240
ttggcctatc	atgtgactga	ggcgttgaag	attaccttac	tattaagttt	ccttttagga	300
tttttgtcca	tcttcgctgg	gaaagagatg	ataggacttt	tggggacgga	gagggatgta	360
gctgagagtg	gtggactgta	tctatctttg	gtaggcggat	cgattgttct	cttaggttta	420
atgactagtc	taggagcctt	gattcgtgca	acgcataatc	cacgtctgcc	tctctatggt	480
agttttttat	ccaatgcctt	gaatattctt	ttttcaagtc	tagctatttt	tgttctggat	540
atggggatag	ctggtgttgc	ttgggggaca	attgtgtctc	gtttggttgg	tcttgtgatt	600
ttgtggtcac	aattaaaact	gccttatggg	aagccaactt	ttggtttaga	taaggaactg	660
ttgaccttgg	ctttaccagc	agctggagag	cgacttatga	tgagggctgg	agatgtagtg	720
atcattgcct	tggtcgtttc	ttttgggacg	gaggcagttg	ctgggaatgc	aatcggagaa	780
gtcttgaccc	agtttaacta	tatgcctgcc	tttggcgctg	ctacggcaac	ggtcatgctg	840
ttggcccagag	cagttggaga	ggatgattgg	aaaagagttg	ctagtttgag	taaacaaacc	900
ttttggcttt	ctctgttctt	catgttgccc	ctgtccttta	gtatatatgt	cctgggtgta	960
ccattaactc	atctctatac	gactgattct	ctagcgggtg	aggctagtgt	tctagtgaca	1020
ctgttttcac	tacttgggac	ccctatgacg	acaggaacag	tcattctatac	ggcagtctgg	1080
cagggattag	gaaatgcacg	cctccctttt	tatgcgacaa	gtataggaat	gtggtgtatc	1140
cgcattggga	caggatatct	gatggggatt	gtgcttggtt	ggggcttgcc	tggtatttgg	1200
gcagggtctc	tcttggataa	tggttttcgc	tggttatttc	tacgctatcg	ttaccagcgc	1260
tatatgagct	tgaaaggata	g				1281

<210> 144
 <211> 426
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 144

Leu Phe Lys Lys Asn Lys Asp Ile Leu Asn Ile Ala Leu Pro Ala Met
1 5 10 15

Gly Glu Asn Phe Leu Gln Met Leu Met Gly Met Val Asp Ser Tyr Leu
 20 25 30
 Val Ala His Leu Gly Leu Ile Ala Ile Ser Gly Val Ser Val Ala Gly
 35 40 45
 Asn Ile Ile Thr Ile Tyr Gln Ala Ile Phe Ile Ala Leu Gly Ala Ala
 50 55 60
 Ile Ser Ser Val Ile Ser Lys Ser Ile Gly Gln Lys Asp Gln Ser Lys
 65 70 75 80
 Leu Ala Tyr His Val Thr Glu Ala Leu Lys Ile Thr Leu Leu Leu Ser
 85 90 95
 Phe Leu Leu Gly Phe Leu Ser Ile Phe Ala Gly Lys Glu Met Ile Gly
 100 105 110
 Leu Leu Gly Thr Glu Arg Asp Val Ala Glu Ser Gly Gly Leu Tyr Leu
 115 120 125
 Ser Leu Val Gly Gly Ser Ile Val Leu Leu Gly Leu Met Thr Ser Leu
 130 135 140
 Gly Ala Leu Ile Arg Ala Thr His Asn Pro Arg Leu Pro Leu Tyr Val
 145 150 155 160
 Ser Phe Leu Ser Asn Ala Leu Asn Ile Leu Phe Ser Ser Leu Ala Ile
 165 170 175
 Phe Val Leu Asp Met Gly Ile Ala Gly Val Ala Trp Gly Thr Ile Val
 180 185 190
 Ser Arg Leu Val Gly Leu Val Ile Leu Trp Ser Gln Leu Lys Leu Pro
 195 200 205
 Tyr Gly Lys Pro Thr Phe Gly Leu Asp Lys Glu Leu Leu Thr Leu Ala
 210 215 220
 Leu Pro Ala Ala Gly Glu Arg Leu Met Met Arg Ala Gly Asp Val Val
 225 230 235 240
 Ile Ile Ala Leu Val Val Ser Phe Gly Thr Glu Ala Val Ala Gly Asn
 245 250 255
 Ala Ile Gly Glu Val Leu Thr Gln Phe Asn Tyr Met Pro Ala Phe Gly
 260 265 270
 Val Ala Thr Ala Thr Val Met Leu Leu Ala Arg Ala Val Gly Glu Asp
 275 280 285
 Asp Trp Lys Arg Val Ala Ser Leu Ser Lys Gln Thr Phe Trp Leu Ser
 290 295 300
 Leu Phe Leu Met Leu Pro Leu Ser Phe Ser Ile Tyr Val Leu Gly Val
 305 310 315 320

Pro Leu Thr His Leu Tyr Thr Thr Asp Ser Leu Ala Val Glu Ala Ser
 325 330 335

Val Leu Val Thr Leu Phe Ser Leu Leu Gly Thr Pro Met Thr Thr Gly
 340 345 350

Thr Val Ile Tyr Thr Ala Val Trp Gln Gly Leu Gly Asn Ala Arg Leu
 355 360 365

Pro Phe Tyr Ala Thr Ser Ile Gly Met Trp Cys Ile Arg Ile Gly Thr
 370 375 380

Gly Tyr Leu Met Gly Ile Val Leu Gly Trp Gly Leu Pro Gly Ile Trp
 385 390 395 400

Ala Gly Ser Leu Leu Asp Asn Gly Phe Arg Trp Leu Phe Leu Arg Tyr
 405 410 415

Arg Tyr Gln Arg Tyr Met Ser Leu Lys Gly
 420 425

<210> 145
 <211> 894
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 145
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 tttcgaacaa gtggaaatta ttctttaaaag gaagcagcag gcgaatcctg ctctacctct 120
 cagttatctc gctttgagct tggggagctc gacctggcag tctcccgttt ctttgagatt 180
 ttggataaca ttcatgtaac aatcgaaaat ttcatggata aggcaaggaa ttttcataat 240
 catgaacatg tgtctatgat ggcacagatt atcccacttt actattcaaa cgatattgca 300
 ggttttcaaa agcttcaaag agaacaactt gaaaagtcta agagttcgac gactcccctt 360
 tattttgagc tgaactggat ttgtctacaa ggtctgattt gtcaaagaga tgcgagttat 420
 gatatgaagc aggatgattt gggttaaggta gcagattatc tcttcaaaac agaagaatgg 480
 accatgtatg agttgattct ttctcgtaac ctctatagtt tctacgatgt agactatgct 540
 actcggattg gtagagaagt tatggagagg gaggaatttt accaagagat tagtcgccat 600
 aagagattag tggtgatttt ggccctcaat tgttaccagc attgtttaga gcattcttct 660
 ttttataatg ccaactattt tgaggcttat acagagaaga ttattgacaa aggtattaag 720
 ctttatgagc gtaatgtttt ccattattta aaagggtttt ccttatatca aaaaggacag 780
 tgtaaagaag gctgtaagca gatgcaagag gccatgcata tttttgatgt gttaggtctt 840
 ccagagcaag tagcctatta tcaggaacac tacgaaaaat ttgtcaaaag ttaa 894

<210> 146
 <211> 297
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 146
 Val Gly Arg Ile Ile Arg Ala Gly Val Lys Met Glu His Leu Gly Lys
 1 5 10 15
 Val Phe Arg Glu Phe Arg Thr Ser Gly Asn Tyr Ser Leu Lys Glu Ala

20					25					30					
Ala	Gly	Glu	Ser	Cys	Ser	Thr	Ser	Gln	Leu	Ser	Arg	Phe	Glu	Leu	Gly
	35						40					45			
Glu	Ser	Asp	Leu	Ala	Val	Ser	Arg	Phe	Phe	Glu	Ile	Leu	Asp	Asn	Ile
	50					55					60				
His	Val	Thr	Ile	Glu	Asn	Phe	Met	Asp	Lys	Ala	Arg	Asn	Phe	His	Asn
	65					70					75				80
His	Glu	His	Val	Ser	Met	Met	Ala	Gln	Ile	Ile	Pro	Leu	Tyr	Tyr	Ser
				85					90					95	
Asn	Asp	Ile	Ala	Gly	Phe	Gln	Lys	Leu	Gln	Arg	Glu	Gln	Leu	Glu	Lys
			100					105					110		
Ser	Lys	Ser	Ser	Thr	Thr	Pro	Leu	Tyr	Phe	Glu	Leu	Asn	Trp	Ile	Leu
		115					120					125			
Leu	Gln	Gly	Leu	Ile	Cys	Gln	Arg	Asp	Ala	Ser	Tyr	Asp	Met	Lys	Gln
	130					135					140				
Asp	Asp	Leu	Gly	Lys	Val	Ala	Asp	Tyr	Leu	Phe	Lys	Thr	Glu	Glu	Trp
	145					150					155				160
Thr	Met	Tyr	Glu	Leu	Ile	Leu	Phe	Gly	Asn	Leu	Tyr	Ser	Phe	Tyr	Asp
				165					170					175	
Val	Asp	Tyr	Val	Thr	Arg	Ile	Gly	Arg	Glu	Val	Met	Glu	Arg	Glu	Glu
			180					185					190		
Phe	Tyr	Gln	Glu	Ile	Ser	Arg	His	Lys	Arg	Leu	Val	Leu	Ile	Leu	Ala
			195					200				205			
Leu	Asn	Cys	Tyr	Gln	His	Cys	Leu	Glu	His	Ser	Ser	Phe	Tyr	Asn	Ala
	210					215					220				
Asn	Tyr	Phe	Glu	Ala	Tyr	Thr	Glu	Lys	Ile	Ile	Asp	Lys	Gly	Ile	Lys
	225					230					235			240	
Leu	Tyr	Glu	Arg	Asn	Val	Phe	His	Tyr	Leu	Lys	Gly	Phe	Ala	Leu	Tyr
				245					250					255	
Gln	Lys	Gly	Gln	Cys	Lys	Glu	Gly	Cys	Lys	Gln	Met	Gln	Glu	Ala	Met
			260					265					270		
His	Ile	Phe	Asp	Val	Leu	Gly	Leu	Pro	Glu	Gln	Val	Ala	Tyr	Tyr	Gln
			275				280					285			
Glu	His	Tyr	Glu	Lys	Phe	Val	Lys	Ser							
	290						295								

<210> 147
 <211> 1068

<212> DNA

<213> Streptococcus pneumoniae

<400> 147

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tccaagtaca ttattcaaga ccgggctttg ccagatatcc gtgatgggtt gaagccgggt 120
cagcgccgta ttctttattc tatgaataag gatagcaata cttttgacaa gagctaccgt 180
aagtcggcca agtcagtcgg gaacatcatg gggaatttcc acccacacgg ggattcttct 240
atctatgatg ccatggttcg tatgtcacag aactggaaaa atcgtgagat tctagttgaa 300
atgcacggta ataacggttc tatggacgga gatcctcctg cggctatgcg ttatactgag 360
gcacgtttgt ctgaaattgc aggtacctt cttcaggata tcgagaaaaa gacagttcct 420
tttgcatgga actttgacga tacggagaaa gaaccaacgg tcttgccagc agcctttcca 480
aacctcttgg tcaatggttc gactgggatt tcggctgggt atgccacaga cattcctccc 540
cataatthag ctgaggtcat agatgctgca gtttacatga ttgaccaccc aactgcaaag 600
attgataaac tcatggaatt cttgcctgga ccagacttcc ctacaggggc tattattcag 660
ggctcgtgatg aaatcaagaa agcttatgag actgggaaaag ggcgctgggt tggtcgttcc 720
aagactgaaa ttgaaaagct aaaaggtggg aaggaacaaa tcgttattat tgagattcct 780
tatgaaatca ataaggccaa tctagtcaag aaaatcgatg atgttcgtgt taataacaag 840
gtagctggga ttgctgaggt tcgtgatgag tctgaccgtg atggtcttcg tatcgctatc 900
gaacttaaga aagacgctaa tactgagctt gttctcaact acttatttaa gtacaccgac 960
ctacaaatca actacaactt taatatgggt gcgattgaca atttcacacc tcgtcaggtt 1020
ggattgttcc aatcctgtct agctatatcg ctcaccgtcg agaagtga 1068
```

<210> 148

<211> 355

<212> PRT

<213> Streptococcus pneumoniae

<400> 148

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Met Ser Asn Ile Gln Asn Met Ser Leu Glu Asp Ile Met Gly Glu Arg
  1              5              10              15
```

```
Phe Gly Arg Tyr Ser Lys Tyr Ile Ile Gln Asp Arg Ala Leu Pro Asp
      20              25              30
```

```
Ile Arg Asp Gly Leu Lys Pro Val Gln Arg Arg Ile Leu Tyr Ser Met
      35              40              45
```

```
Asn Lys Asp Ser Asn Thr Phe Asp Lys Ser Tyr Arg Lys Ser Ala Lys
      50              55              60
```

```
Ser Val Gly Asn Ile Met Gly Asn Phe His Pro His Gly Asp Ser Ser
      65              70              75              80
```

```
Ile Tyr Asp Ala Met Val Arg Met Ser Gln Asn Trp Lys Asn Arg Glu
      85              90              95
```

```
Ile Leu Val Glu Met His Gly Asn Asn Gly Ser Met Asp Gly Asp Pro
     100             105             110
```

```
Pro Ala Ala Met Arg Tyr Thr Glu Ala Arg Leu Ser Glu Ile Ala Gly
     115             120             125
```

```
Tyr Leu Leu Gln Asp Ile Glu Lys Lys Thr Val Pro Phe Ala Trp Asn
     130             135             140
```

Phe Asp Asp Thr Glu Lys Glu Pro Thr Val Leu Pro Ala Ala Phe Pro
 145 150 155 160
 Asn Leu Leu Val Asn Gly Ser Thr Gly Ile Ser Ala Gly Tyr Ala Thr
 165 170 175
 Asp Ile Pro Pro His Asn Leu Ala Glu Val Ile Asp Ala Ala Val Tyr
 180 185 190
 Met Ile Asp His Pro Thr Ala Lys Ile Asp Lys Leu Met Glu Phe Leu
 195 200 205
 Pro Gly Pro Asp Phe Pro Thr Gly Ala Ile Ile Gln Gly Arg Asp Glu
 210 215 220
 Ile Lys Lys Ala Tyr Glu Thr Gly Lys Gly Arg Val Val Val Arg Ser
 225 230 235 240
 Lys Thr Glu Ile Glu Lys Leu Lys Gly Gly Lys Glu Gln Ile Val Ile
 245 250 255
 Ile Glu Ile Pro Tyr Glu Ile Asn Lys Ala Asn Leu Val Lys Lys Ile
 260 265 270
 Asp Asp Val Arg Val Asn Asn Lys Val Ala Gly Ile Ala Glu Val Arg
 275 280 285
 Asp Glu Ser Asp Arg Asp Gly Leu Arg Ile Ala Ile Glu Leu Lys Lys
 290 295 300
 Asp Ala Asn Thr Glu Leu Val Leu Asn Tyr Leu Phe Lys Tyr Thr Asp
 305 310 315 320
 Leu Gln Ile Asn Tyr Asn Phe Asn Met Val Ala Ile Asp Asn Phe Thr
 325 330 335
 Pro Arg Gln Val Gly Leu Phe Gln Ser Cys Leu Ala Ile Ser Leu Thr
 340 345 350
 Val Glu Lys
 355

<210> 149
 <211> 684
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 149
 atgccgacat tagaaatagc acaaaaaaaaa ctggagttca ttaagaaggc agaagaatat 60
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 acttctgtta accctgggga aggaaaaaca actacttcca taaatatagc atggtcggtt 180
 gcgcgtgcag gctataaaac tcttttgatc gatggcgata ctcgaaattc agttatgtta 240
 ggagttttta aatctcgtga aaaaattaca gggctaacag aatttttatc tgggacagct 300
 gatttatctc acggtttatg tgatacaaat attgaaaatt tattttagt tcaatcggga 360
 tctgtatcac caaacctac agccttggtta caaagtaaaa attttaatga tatgattgaa 420

acattgcgta aatattttga ttatatcatt attgatacac cgcctattgg aattggttatt 480
gatgcggcaa ttatcactca aaagtgtgat gcgtccatct tggtaacagc aacaggtgag 540
gcgaataaac gtgatatcca aaaagcgaaa caacaattaa aacaaacagg gaaactgttc 600
ctaggagttg ttttaaataa attggatatc tcggttaata agtatggagt ttacgggttc 660
tatggaaatt atggtaaaaa ataa 684

<210> 150

<211> 227

<212> PRT

<213> Streptococcus pneumoniae

<400> 150

Met Pro Thr Leu Glu Ile Ala Gln Lys Lys Leu Glu Phe Ile Lys Lys
1 5 10 15

Ala Glu Glu Tyr Tyr Asn Ala Leu Cys Thr Asn Ile Gln Leu Ser Gly
20 25 30

Asp Lys Leu Lys Val Ile Ser Val Thr Ser Val Asn Pro Gly Glu Gly
35 40 45

Lys Thr Thr Thr Ser Ile Asn Ile Ala Trp Ser Phe Ala Arg Ala Gly
50 55 60

Tyr Lys Thr Leu Leu Ile Asp Gly Asp Thr Arg Asn Ser Val Met Leu
65 70 75 80

Gly Val Phe Lys Ser Arg Glu Lys Ile Thr Gly Leu Thr Glu Phe Leu
85 90 95

Ser Gly Thr Ala Asp Leu Ser His Gly Leu Cys Asp Thr Asn Ile Glu
100 105 110

Asn Leu Phe Val Val Gln Ser Gly Ser Val Ser Pro Asn Pro Thr Ala
115 120 125

Leu Leu Gln Ser Lys Asn Phe Asn Asp Met Ile Glu Thr Leu Arg Lys
130 135 140

Tyr Phe Asp Tyr Ile Ile Ile Asp Thr Pro Pro Ile Gly Ile Val Ile
145 150 155 160

Asp Ala Ala Ile Ile Thr Gln Lys Cys Asp Ala Ser Ile Leu Val Thr
165 170 175

Ala Thr Gly Glu Ala Asn Lys Arg Asp Ile Gln Lys Ala Lys Gln Gln
180 185 190

Leu Lys Gln Thr Gly Lys Leu Phe Leu Gly Val Val Leu Asn Lys Leu
195 200 205

Asp Ile Ser Val Asn Lys Tyr Gly Val Tyr Gly Ser Tyr Gly Asn Tyr
210 215 220

Gly Lys Lys
225

<210> 151
 <211> 1194
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 151
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 caaaaaagta gtgtaaaca ctctaacaac aatagtacta ttacacaaac tgcctataag 180
 aacgaaaatt caacaacaca ggctgttaac aaagtaaaag atgctgttgt ttctgttatt 240
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 aaaatctctt cagaaaaagt gacaacagta gctgagtttg gtgattctag taagttaact 540
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<210> 152
 <211> 397
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 152
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 Ser Phe Ser Ile Thr Gln Leu Thr Gln Lys Ser Ser Val Asn Asn Ser
 35 40 45
 Asn Asn Asn Ser Thr Ile Thr Gln Thr Ala Tyr Lys Asn Glu Asn Ser
 50 55 60
 Thr Thr Gln Ala Val Asn Lys Val Lys Asp Ala Val Val Ser Val Ile
 65 70 75 80
 Thr Tyr Ser Ala Asn Arg Gln Asn Ser Val Phe Gly Asn Asp Asp Thr
 85 90 95
 Asp Thr Asp Ser Gln Arg Ile Ser Ser Glu Gly Ser Gly Val Ile Tyr
 100 105 110

Lys Lys Asn Asp Lys Glu Ala Tyr Ile Val Thr Asn Asn His Val Ile
 115 120 125
 Asn Gly Ala Ser Lys Val Asp Ile Arg Leu Ser Asp Gly Thr Lys Val
 130 135 140
 Pro Gly Glu Ile Val Gly Ala Asp Thr Phe Ser Asp Ile Ala Val Val
 145 150 155 160
 Lys Ile Ser Ser Glu Lys Val Thr Thr Val Ala Glu Phe Gly Asp Ser
 165 170 175
 Ser Lys Leu Thr Val Gly Glu Thr Ala Ile Ala Ile Gly Ser Pro Leu
 180 185 190
 Gly Ser Glu Tyr Ala Asn Thr Val Thr Gln Gly Ile Val Ser Ser Leu
 195 200 205
 Asn Arg Asn Val Ser Leu Lys Ser Glu Asp Gly Gln Ala Ile Ser Thr
 210 215 220
 Lys Ala Ile Gln Thr Asp Thr Ala Ile Asn Pro Gly Asn Ser Gly Gly
 225 230 235 240
 Pro Leu Ile Asn Ile Gln Gly Gln Val Ile Gly Ile Thr Ser Ser Lys
 245 250 255
 Ile Ala Thr Asn Gly Gly Thr Ser Val Glu Gly Leu Gly Phe Ala Ile
 260 265 270
 Pro Ala Asn Asp Ala Ile Asn Ile Ile Glu Gln Leu Glu Lys Asn Gly
 275 280 285
 Lys Val Thr Arg Pro Ala Leu Gly Ile Gln Met Val Asn Leu Ser Asn
 290 295 300
 Val Ser Thr Ser Asp Ile Arg Arg Leu Asn Ile Pro Ser Asn Val Thr
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 Ser Gly Val Ile Val Arg Ser Val Gln Ser Asn Met Pro Ala Asn Gly
 325 330 335
 His Leu Glu Lys Tyr Asp Val Ile Thr Lys Val Asp Asp Lys Glu Ile
 340 345 350
 Ala Ser Ser Thr Asp Leu Gln Ser Ala Leu Tyr Asn His Ser Ile Gly
 355 360 365
 Asp Thr Ile Lys Ile Thr Tyr Tyr Arg Asn Gly Lys Glu Glu Thr Thr
 370 375 380
 Ser Ile Lys Leu Asn Lys Ser Ser Gly Asp Leu Glu Ser
 385 390 395

<210> 153
 <211> 939
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 153
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 aatcaacaag ggaatgaccg tggtcgccaa tatcgaactg ggatttatta tcaggatgaa 300
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<210> 154
 <211> 312
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 154
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 Asn Gly Gln Val Glu Thr Thr Asn Tyr Gln Leu Leu Lys Glu Thr Asp
 35 40 45
 His Ala Glu Thr Val Gln Val Ile Tyr Asp Glu Lys Glu Val Ser Leu
 50 55 60
 Arg Glu Ile Leu Leu Tyr Tyr Phe Arg Val Ile Asp Pro Leu Ser Ile
 65 70 75 80
 Asn Gln Gln Gly Asn Asp Arg Gly Arg Gln Tyr Arg Thr Gly Ile Tyr
 85 90 95
 Tyr Gln Asp Glu Ala Asp Leu Pro Ala Ile Tyr Thr Val Val Gln Glu
 100 105 110
 Gln Glu Arg Met Leu Gly Arg Lys Ile Ala Val Glu Val Glu Gln Leu
 115 120 125
 Arg His Tyr Ile Leu Ala Glu Asp Tyr His Gln Asp Tyr Leu Arg Lys
 130 135 140

Asn Pro Ser Gly Tyr Cys His Ile Asp Val Thr Asp Ala Asp Lys Pro
145 150 155 160

Leu Ile Asp Ala Ala Asn Tyr Glu Lys Pro Ser Gln Glu Val Leu Lys
165 170 175

Ala Ser Leu Ser Glu Glu Ser Tyr Arg Val Thr Gln Glu Ala Ala Thr
180 185 190

Glu Ala Pro Phe Thr Asn Ala Tyr Asp Gln Thr Phe Glu Glu Gly Ile
195 200 205

Tyr Val Asp Ile Thr Thr Gly Glu Pro Leu Phe Phe Ala Lys Asp Lys
210 215 220

Phe Ala Ser Gly Cys Gly Trp Pro Ser Phe Ser Arg Pro Ile Ser Lys
225 230 235 240

Glu Leu Ile His Tyr Tyr Lys Asp Leu Ser His Gly Met Glu Arg Ile
245 250 255

Glu Val Arg Ser Arg Ser Gly Ser Ala His Leu Gly His Val Phe Thr
260 265 270

Asp Gly Pro Arg Glu Leu Gly Gly Leu Arg Tyr Cys Ile Asn Ser Ala
275 280 285

Ser Leu Arg Phe Val Ala Lys Asp Glu Met Glu Lys Ala Gly Tyr Gly
290 295 300

Tyr Leu Leu Pro Tyr Leu Asn Lys
305 310

<210> 155

<211> 870

<212> DNA

<213> Streptococcus pneumoniae

<400> 155

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gaacaccaga ttggcaaattg gattccacat gacgagcgta atctcttgct caaaatcgct 180
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acccaagggtg tccgtgtaga agcaaaataa 870

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<210> 156

<211> 289

<212> PRT

<213> Streptococcus pneumoniae

<400> 156

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Glu Glu Arg Asp Glu Trp Leu Ile Glu His Gln Ile Gly Lys Trp Ile
35 40 45

Pro His Asp Glu Arg Asn Leu Leu Lys Ile Ala Leu Gln Ile Val
50 55 60

Pro Asp Leu Gln Pro Arg Arg Leu Lys Met Thr Ser Asp Val Pro Leu
65 70 75 80

Ala Arg Gly Leu Gly Ser Ser Ser Ser Val Ile Val Ala Gly Ile Glu
85 90 95

Leu Ala Asn Gln Leu Gly Gln Leu Asn Leu Ser Asp His Glu Lys Leu
100 105 110

Gln Leu Ala Thr Lys Ile Glu Gly His Pro Asp Asn Val Ala Pro Ala
115 120 125

Ile Tyr Gly Asn Leu Val Ile Ala Ser Ser Val Glu Gly Gln Val Ser
130 135 140

Ala Ile Val Ala Asp Phe Pro Glu Cys Asp Phe Leu Ala Tyr Ile Pro
145 150 155 160

Asn Tyr Glu Leu Arg Thr Arg Asp Ser Arg Ser Val Leu Pro Lys Lys
165 170 175

Leu Ser Tyr Lys Glu Ala Val Ala Ala Ser Ser Ile Ala Asn Val Ala
180 185 190

Val Ala Ala Leu Leu Ala Gly Asp Met Val Thr Ala Gly Gln Ala Ile
195 200 205

Glu Gly Asp Leu Phe His Glu Arg Tyr Arg Gln Asp Leu Val Arg Glu
210 215 220

Phe Ala Met Ile Lys Gln Val Thr Lys Glu Asn Gly Ala Tyr Ala Thr
225 230 235 240

Tyr Leu Ser Gly Ala Gly Pro Thr Val Met Val Leu Ala Ser His Asp
245 250 255

Lys Met Pro Thr Ile Lys Ala Glu Leu Glu Lys Gln Pro Phe Lys Gly
260 265 270

Lys Leu His Asp Leu Arg Val Asp Thr Gln Gly Val Arg Val Glu Ala
 275 280 285

Lys

<210> 157
 <211> 564
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 157
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 gtctatcaag ctttaaagggt ttctactcct tttgcgattg agacattcgc tccaatttta 180
 gagaattttt tagaaaagta caaggaaaat gaagccagag agcttgaaca cccgatttta 240
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 ctttatttaa gagaaaagta tcagattagc tctggtcttg tcattggtga tcggccgatt 480
 gatatcgaag caggtcaagc tgcaggactt gatacccact tgtttaccag tatcgtgaat 540
 ttaagacaag tattagacat ataa 564

<210> 158
 <211> 187
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 158
 Met Lys Tyr His Asp Tyr Ile Trp Asp Leu Gly Gly Thr Leu Leu Asp
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 Asn Tyr Glu Thr Ser Thr Ala Ala Phe Val Glu Thr Leu Ala Leu Tyr
 20 25 30
 Gly Ile Thr Gln Asp His Asp Ser Val Tyr Gln Ala Leu Lys Val Ser
 35 40 45
 Thr Pro Phe Ala Ile Glu Thr Phe Ala Pro Asn Leu Glu Asn Phe Leu
 50 55 60
 Glu Lys Tyr Lys Glu Asn Glu Ala Arg Glu Leu Glu His Pro Ile Leu
 65 70 75 80
 Phe Glu Gly Val Ser Asp Leu Leu Glu Asp Ile Ser Asn Gln Gly Gly
 85 90 95
 Arg His Phe Leu Val Ser His Arg Asn Asp Gln Val Leu Glu Ile Leu
 100 105 110
 Glu Lys Thr Ser Ile Ala Ala Tyr Phe Thr Glu Val Val Thr Ser Ser
 115 120 125

Ser Gly Phe Lys Arg Lys Pro Asn Pro Glu Ser Met Leu Tyr Leu Arg
 130 135 140

Glu Lys Tyr Gln Ile Ser Ser Gly Leu Val Ile Gly Asp Arg Pro Ile
 145 150 155 160

Asp Ile Glu Ala Gly Gln Ala Ala Gly Leu Asp Thr His Leu Phe Thr
 165 170 175

Ser Ile Val Asn Leu Arg Gln Val Leu Asp Ile
 180 185

<210> 159
 <211> 1875
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 159
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<210> 160
 <211> 624
 <212> PRT

<213> Streptococcus pneumoniae

<400> 160

Met Thr Glu Glu Ile Lys Asn Leu Gln Ala Gln Asp Tyr Asp Ala Ser
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Gln Ile Gln Val Leu Glu Gly Leu Glu Ala Val Arg Met Arg Pro Gly
20 25 30

Met Tyr Ile Gly Ser Thr Ser Lys Glu Gly Leu His His Leu Val Trp
35 40 45

Glu Ile Val Asp Asn Ser Ile Asp Glu Ala Leu Ala Gly Phe Ala Ser
50 55 60

His Ile Gln Val Phe Ile Glu Pro Asp Asp Ser Ile Thr Val Val Asp
65 70 75 80

Asp Gly Arg Gly Ile Pro Val Asp Ile Gln Glu Lys Thr Gly Arg Pro
85 90 95

Ala Val Glu Thr Val Phe Thr Val Leu His Ala Gly Gly Lys Phe Gly
100 105 110

Gly Gly Gly Tyr Lys Val Ser Gly Gly Leu His Gly Val Gly Ser Ser
115 120 125

Val Val Asn Ala Leu Ser Thr Gln Leu Asp Val His Val His Lys Asn
130 135 140

Gly Lys Ile His Tyr Gln Glu Tyr Arg Arg Gly His Val Val Ala Asp
145 150 155 160

Leu Glu Ile Val Gly Asp Thr Asp Lys Thr Gly Thr Thr Val His Phe
165 170 175

Thr Pro Asp Pro Lys Ile Phe Thr Glu Thr Thr Ile Phe Asp Phe Asp
180 185 190

Lys Leu Asn Lys Arg Ile Gln Glu Leu Ala Phe Leu Asn Arg Gly Leu
195 200 205

Gln Ile Ser Ile Thr Asp Lys Arg Gln Gly Leu Glu Gln Thr Lys His
210 215 220

Tyr His Tyr Glu Gly Gly Ile Ala Ser Tyr Val Glu Tyr Ile Asn Glu
225 230 235 240

Asn Lys Asp Val Ile Phe Asp Thr Pro Ile Tyr Thr Asp Gly Glu Met
245 250 255

Asp Asp Ile Thr Val Glu Val Ala Met Gln Tyr Thr Thr Gly Tyr His
260 265 270

Glu Asn Val Met Ser Phe Ala Asn Asn Ile His Thr His Glu Gly Gly
275 280 285

Thr His Glu Gln Gly Phe Arg Thr Ala Leu Thr Arg Val Ile Asn Asp
 290 295 300
 Tyr Ala Arg Lys Asn Lys Leu Leu Lys Asp Asn Glu Asp Asn Leu Thr
 305 310 315 320
 Gly Glu Asp Val Arg Glu Gly Leu Thr Ala Val Ile Ser Val Lys His
 325 330 335
 Pro Asn Pro Gln Phe Glu Gly Gln Thr Lys Thr Lys Leu Gly Asn Ser
 340 345 350
 Glu Val Val Lys Ile Thr Asn Arg Leu Phe Ser Glu Ala Phe Ser Asp
 355 360 365
 Phe Leu Met Glu Asn Pro Gln Ile Ala Lys Arg Ile Val Glu Lys Gly
 370 375 380
 Ile Leu Ala Ala Lys Ala Arg Val Ala Ala Lys Arg Ala Arg Glu Val
 385 390 395 400
 Thr Arg Lys Lys Ser Gly Leu Glu Ile Ser Asn Leu Pro Gly Lys Leu
 405 410 415
 Ala Asp Cys Ser Ser Asn Asn Pro Ala Glu Thr Glu Leu Phe Ile Val
 420 425 430
 Glu Gly Asp Ser Ala Gly Gly Ser Ala Lys Ser Gly Arg Asn Arg Glu
 435 440 445
 Phe Gln Ala Ile Leu Pro Ile Arg Gly Lys Ile Leu Asn Val Glu Lys
 450 455 460
 Ala Ser Met Asp Lys Ile Leu Ala Asn Glu Glu Ile Arg Ser Leu Phe
 465 470 475 480
 Thr Ala Met Gly Thr Gly Phe Gly Ala Glu Phe Asp Val Ser Lys Ala
 485 490 495
 Arg Tyr Gln Lys Leu Val Leu Met Thr Asp Ala Asp Val Asp Gly Ala
 500 505 510
 His Ile Arg Thr Leu Leu Leu Thr Leu Ile Tyr Arg Tyr Met Lys Pro
 515 520 525
 Ile Leu Glu Ala Gly Tyr Val Tyr Ile Ala Gln Pro Pro Ile Tyr Gly
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 Val Lys Val Gly Ser Glu Ile Lys Glu Tyr Ile Gln Pro Gly Ala Asp
 545 550 555 560
 Gln Glu Ile Lys Leu Gln Glu Ala Leu Ala Arg Tyr Ser Glu Gly Arg
 565 570 575
 Thr Lys Pro Thr Ile Gln Arg Tyr Lys Gly Leu Gly Glu Met Asp Asp
 580 585 590

His Gln Leu Trp Glu Thr Thr Met Asp Pro Glu His Arg Leu Met Ala
 595 600 605

Arg Val Ser Val Asp Asp Val Gln Lys Gln Ile Lys Ser Leu Ile Cys
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<210> 161

<211> 1446

<212> DNA

<213> Streptococcus pneumoniae

<400> 161

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agatga 1446

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<210> 162

<211> 481

<212> PRT

<213> Streptococcus pneumoniae

<400> 162

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 20 25 30

Leu Phe Leu Ile Phe Lys Tyr Asn Ile Leu Ala Phe Arg Tyr Leu Asn

35	40	45
Leu Val Val Thr Ala Leu Val Leu Leu Val Ala Leu Val Gly Leu Leu		
50	55	60
Leu Ile Ile Tyr Lys Lys Ala Glu Lys Phe Thr Ile Phe Leu Leu Val		
65	70	75
Phe Ser Ile Leu Val Ser Ser Val Ser Leu Phe Ala Val Gln Gln Phe		
85	90	95
Val Gly Leu Thr Asn Arg Leu Asn Ala Thr Ser Asn Tyr Ser Glu Tyr		
100	105	110
Ser Ile Ser Val Ala Val Leu Ala Asp Ser Glu Ile Glu Asn Val Thr		
115	120	125
Gln Leu Thr Ser Val Thr Ala Pro Thr Gly Thr Asn Asn Glu Asn Ile		
130	135	140
Gln Lys Leu Leu Ala Asp Ile Lys Ser Ser Gln Asn Thr Asp Leu Thr		
145	150	155
Val Asn Gln Ser Ser Ser Tyr Leu Ala Ala Tyr Lys Ser Leu Ile Ala		
165	170	175
Gly Glu Thr Lys Ala Ile Val Leu Asn Ser Val Phe Glu Asn Ile Ile		
180	185	190
Glu Ser Glu Tyr Pro Asp Tyr Ala Ser Lys Ile Lys Lys Ile Tyr Thr		
195	200	205
Lys Gly Phe Thr Lys Lys Val Glu Ala Pro Lys Thr Ser Lys Ser Gln		
210	215	220
Ser Phe Asn Ile Tyr Val Ser Gly Ile Asp Thr Tyr Gly Pro Ile Ser		
225	230	235
Ser Val Ser Arg Ser Asp Val Asn Ile Leu Met Thr Val Asn Arg Asp		
245	250	255
Thr Lys Lys Ile Leu Leu Thr Thr Thr Pro Arg Asp Ala Tyr Val Pro		
260	265	270
Ile Ala Asp Gly Gly Asn Asn Gln Lys Asp Lys Leu Thr His Ala Gly		
275	280	285
Ile Tyr Gly Val Asp Ser Ser Ile His Thr Leu Glu Asn Leu Tyr Gly		
290	295	300
Val Asp Ile Asn Tyr Tyr Val Arg Leu Asn Phe Thr Ser Phe Leu Lys		
305	310	315
Leu Ile Asp Leu Leu Gly Gly Ile Asp Val Tyr Asn Asp Gln Glu Phe		
325	330	335
Thr Ala His Thr Asn Gly Lys Tyr Tyr Pro Ala Gly Asn Val His Leu		

340	345	350
Asp Ser Glu Gln Ala Leu Gly Phe Val Arg Glu Arg Tyr Ser Leu Ala		
355	360	365
Asp Gly Asp Arg Asp Arg Gly Arg His Gln Gln Lys Val Ile Val Ala		
370	375	380
Ile Leu Gln Lys Leu Thr Ser Thr Glu Val Leu Lys Asn Tyr Ser Thr		
385	390	395
Ile Ile Asn Ser Leu Gln Asp Ser Ile Gln Thr Asn Met Pro Leu Glu		
405	410	415
Thr Met Ile Asn Leu Val Asn Ala Gln Leu Glu Ser Gly Gly Asn Tyr		
420	425	430
Lys Val Asn Ser Gln Asp Leu Lys Gly Thr Gly Arg Met Asp Leu Pro		
435	440	445
Ser Tyr Ala Met Pro Asp Ser Asn Leu Tyr Val Met Glu Ile Asp Asp		
450	455	460
Ser Ser Leu Ala Val Val Lys Ala Ala Ile Gln Asp Val Met Glu Gly		
465	470	475
480		
Arg		

<210> 163
 <211> 732
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 163
 atgatagaca tccattcgca tatcgttttt gatgtagatg acggtcccaa gtcaagagag 60
 gaaagcaagg ctctcttggc agaatcctac agacaggggg tgcgaaaccat tgtttctacc 120
 tctcaccgtc gcaagggcat gtttgaaact ccggaagaga agatagcaga aaactttctt 180
 caggttcggg aaatagctaa ggaagtggcg agtgacttgg tcattgctta cggggctgaa 240
 atttattaca caccagatgt tctggataag ctggaaaaaa agcggattcc gaccctcaat 300
 gatagtcgtt atgccttgat agagtttagt atgaacactc cttatcgcgga tattcatagc 360
 gccttgagca agatcttgat gttgggaatt actccagtca ttgcccacat tgagcgctat 420
 gatgctcttg aaaataatga aaaacgcgtt cgagaactga tcgatatggg ctgttacacg 480
 caagtaaata gttcacatgt cctcaaacc aaactttttg gcgaacgtta taaattcatg 540
 aaaaaaagag ctcaagtattt tttagagcag gatttggttc atgtcattgc aagtgatatg 600
 cacaatctag acggtagacc tcctcatatg gcagaagcat atgaccttgt taccctaaaaa 660
 tacggagaag cgaagggtca ggaacttttt atagacaatc ctcgaaaaat tgtaatggat 720
 caactaattt ag 732

<210> 164
 <211> 243
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 164

Met Ile Asp Ile His Ser His Ile Val Phe Asp Val Asp Asp Gly Pro
1 5 10 15

Lys Ser Arg Glu Glu Ser Lys Ala Leu Leu Ala Glu Ser Tyr Arg Gln
20 25 30

Gly Val Arg Thr Ile Val Ser Thr Ser His Arg Arg Lys Gly Met Phe
35 40 45

Glu Thr Pro Glu Glu Lys Ile Ala Glu Asn Phe Leu Gln Val Arg Glu
50 55 60

Ile Ala Lys Glu Val Ala Ser Asp Leu Val Ile Ala Tyr Gly Ala Glu
65 70 75 80

Ile Tyr Tyr Thr Pro Asp Val Leu Asp Lys Leu Glu Lys Lys Arg Ile
85 90 95

Pro Thr Leu Asn Asp Ser Arg Tyr Ala Leu Ile Glu Phe Ser Met Asn
100 105 110

Thr Pro Tyr Arg Asp Ile His Ser Ala Leu Ser Lys Ile Leu Met Leu
115 120 125

Gly Ile Thr Pro Val Ile Ala His Ile Glu Arg Tyr Asp Ala Leu Glu
130 135 140

Asn Asn Glu Lys Arg Val Arg Glu Leu Ile Asp Met Gly Cys Tyr Thr
145 150 155 160

Gln Val Asn Ser Ser His Val Leu Lys Pro Lys Leu Phe Gly Glu Arg
165 170 175

Tyr Lys Phe Met Lys Lys Arg Ala Gln Tyr Phe Leu Glu Gln Asp Leu
180 185 190

Val His Val Ile Ala Ser Asp Met His Asn Leu Asp Gly Arg Pro Pro
195 200 205

His Met Ala Glu Ala Tyr Asp Leu Val Thr Gln Lys Tyr Gly Glu Ala
210 215 220

Lys Ala Gln Glu Leu Phe Ile Asp Asn Pro Arg Lys Ile Val Met Asp
225 230 235 240

Gln Leu Ile

<210> 165

<211> 3990

<212> DNA

<213> Streptococcus pneumoniae

<400> 165

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ggattttgcct	tccaagcaca	gactgttgca	gccgatggag	ttactcctac	tactacagaa	180
aaccaaccga	ccatccatac	ggtttctgat	tccctcaat	catccgaaaa	tcggaactgag	240
gaaacaccta	aagcagtgct	tcaaccagaa	gtcccaaaaa	ctgtagaaac	agaaactcca	300
gctactgata	aggtagctag	tcttccaaaa	acagaagaaa	aaccacaaga	ggaagttagt	360
tcaactccta	gtgataaagc	agaagtggta	actccaactt	ctgctgaaaa	agaaactgct	420
aataaaaagg	cagaagaagc	tagccctaaa	aaggaagaag	cgaaagaggt	tgattctaaa	480
gagtcaaata	cagacaagac	tgacaaggat	aaaccagcta	aaaaagatga	agcgaaagca	540
gaggctgaca	aaccggcaac	agaggcagga	aaggaacgtg	ctgcaactgt	aatgaaaaa	600
ctagcgaaaa	agaaaattgt	ttctattgat	gctggacgta	aatatttctc	accagaacag	660
ctcaaggaaa	tcatcgataa	agcgaaacat	tatggctaca	ctgatttaca	cctattagtc	720
ggaaatgatg	gactccgttt	catgttggac	gatatgagca	tcacagctaa	cggcaagacc	780
tatgccagtg	acgatgtcaa	acgcgccatt	gaaaaaggta	caaatagatta	ttacaacgat	840
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aaaggatatcg	gtctcattcc	gacagtaaat	agtcctggac	acatggatgc	gattctcaat	960
gccatgaaag	aattgggaat	ccaaaaccct	aacttttagct	attttgggaa	gaaatcagcc	1020
cgtactgtcg	atcttgacaa	cgaacaagct	gtcgctttta	caaaagccct	tatcgacaag	1080
tatgctgctt	atttcgcgaa	aaagactgaa	atcttcaaca	tgggaactga	tgaatatgcc	1140
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aaccgttata	ctgcagaaag	cgtcacggcc	gtaaaagaag	ctgaaaaagc	tattcgctct	1800
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gtcggaagta	tgctttcaat	ctgggcagat	agaccaagcg	ctgaatacaa	ggaagaggaa	2940
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aatgctctcc	gcgaagaatt	agctaaaatt	cctacaaaact	tagaaggata	tagtaaagaa	3060
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caagctgagc	ttgacacgct	tgtagccaac	ctaaaagccg	ctcttcaagg	cctcaaacca	3180
gctgtaactc	attcaggaag	cctagatgaa	aatgaagtgg	ctgccaatgt	tgaaaccaga	3240
ccagaactca	tcacaagaac	tgaagaaatt	ccatttgaag	ttatcaagaa	agaaaatcct	3300
aacctcccag	ccggtcagga	aaatattatc	acagcaggag	tcaaagggtga	acgaactcat	3360
tacatctctg	tactcactga	aaatggaaaa	acaacagaaa	cagtccttga	tagccaggta	3420

accaaagaag ttataaacca agtgggtgaa gttggcgctc ctgtaactca caaggggtgat 3480
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 gtcgaagtgc gaactatggt aacacatgta ggcatgaaa acggacaagc cgctattgct 3780
 gaagaaaaac caaaaactaga aatcccaagc caaccagctc catcaactgc tcctgctgag 3840
 gaaagcaaag ttcttcctca agatccagct cctgtggtta cagagaaaaa acttcctgaa 3900
 acaggaactc acgattctgc aggactagta gtcgcaggac tcatgtccac actagcagcc 3960
 tatggactca ctaaaaagaaa agaagactaa 3990

<210> 166

<211> 1329

<212> PRT

<213> Streptococcus pneumoniae

<400> 166

Met Ile Tyr Ile Ile Ala Ile Asn Ile Thr Met Gln Ser Gly Gly Phe
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Ala Met Lys His Glu Lys Gln Gln Arg Phe Ser Ile Arg Lys Tyr Ala
 20 25 30

Val Gly Ala Ala Ser Val Leu Ile Gly Phe Ala Phe Gln Ala Gln Thr
 35 40 45

Val Ala Ala Asp Gly Val Thr Pro Thr Thr Thr Glu Asn Gln Pro Thr
 50 55 60

Ile His Thr Val Ser Asp Ser Pro Gln Ser Ser Glu Asn Arg Thr Glu
 65 70 75 80

Glu Thr Pro Lys Ala Val Leu Gln Pro Glu Ala Pro Lys Thr Val Glu
 85 90 95

Thr Glu Thr Pro Ala Thr Asp Lys Val Ala Ser Leu Pro Lys Thr Glu
 100 105 110

Glu Lys Pro Gln Glu Glu Val Ser Ser Thr Pro Ser Asp Lys Ala Glu
 115 120 125

Val Val Thr Pro Thr Ser Ala Glu Lys Glu Thr Ala Asn Lys Lys Ala
 130 135 140

Glu Glu Ala Ser Pro Lys Lys Glu Glu Ala Lys Glu Val Asp Ser Lys
 145 150 155 160

Glu Ser Asn Thr Asp Lys Thr Asp Lys Asp Lys Pro Ala Lys Lys Asp
 165 170 175

Glu Ala Lys Ala Glu Ala Asp Lys Pro Ala Thr Glu Ala Gly Lys Glu
 180 185 190

Arg Ala Ala Thr Val Asn Glu Lys Leu Ala Lys Lys Lys Ile Val Ser
 195 200 205

Ile Asp Ala Gly Arg Lys Tyr Phe Ser Pro Glu Gln Leu Lys Glu Ile
 210 215 220
 Ile Asp Lys Ala Lys His Tyr Gly Tyr Thr Asp Leu His Leu Leu Val
 225 230 235 240
 Gly Asn Asp Gly Leu Arg Phe Met Leu Asp Asp Met Ser Ile Thr Ala
 245 250 255
 Asn Gly Lys Thr Tyr Ala Ser Asp Asp Val Lys Arg Ala Ile Glu Lys
 260 265 270
 Gly Thr Asn Asp Tyr Tyr Asn Asp Pro Asn Gly Asn His Leu Thr Glu
 275 280 285
 Ser Gln Met Thr Asp Leu Ile Asn Tyr Ala Lys Asp Lys Gly Ile Gly
 290 295 300
 Leu Ile Pro Thr Val Asn Ser Pro Gly His Met Asp Ala Ile Leu Asn
 305 310 315 320
 Ala Met Lys Glu Leu Gly Ile Gln Asn Pro Asn Phe Ser Tyr Phe Gly
 325 330 335
 Lys Lys Ser Ala Arg Thr Val Asp Leu Asp Asn Glu Gln Ala Val Ala
 340 345 350
 Phe Thr Lys Ala Leu Ile Asp Lys Tyr Ala Ala Tyr Phe Ala Lys Lys
 355 360 365
 Thr Glu Ile Phe Asn Ile Gly Leu Asp Glu Tyr Ala Asn Asp Ala Thr
 370 375 380
 Asp Ala Lys Gly Trp Ser Val Leu Gln Ala Asp Lys Tyr Tyr Pro Asn
 385 390 395 400
 Glu Gly Tyr Pro Val Lys Gly Tyr Glu Lys Phe Ile Ala Tyr Ala Asn
 405 410 415
 Asp Leu Ala Arg Ile Val Lys Ser His Gly Leu Lys Pro Met Ala Phe
 420 425 430
 Asn Asp Gly Ile Tyr Tyr Asn Ser Asp Thr Ser Phe Gly Ser Phe Asp
 435 440 445
 Lys Asp Ile Ile Val Ser Met Trp Thr Gly Gly Trp Gly Gly Tyr Asp
 450 455 460
 Val Ala Ser Ser Lys Leu Leu Ala Glu Lys Gly His Gln Ile Leu Asn
 465 470 475 480
 Thr Asn Asp Ala Trp Tyr Tyr Val Leu Gly Arg Asn Ala Asp Gly Gln
 485 490 495
 Gly Trp Tyr Asn Leu Asp Gln Gly Leu Asn Gly Ile Lys Asn Thr Pro
 500 505 510

Ile Thr Ser Val Pro Lys Thr Glu Gly Ala Asp Ile Pro Ile Ile Gly
 515 520 525
 Gly Met Val Ala Ala Trp Ala Asp Thr Pro Ser Ala Arg Tyr Ser Pro
 530 535 540
 Ser Arg Leu Phe Lys Leu Met Arg His Phe Ala Asn Ala Asn Ala Glu
 545 550 555 560
 Tyr Phe Ala Ala Asp Tyr Glu Ser Ala Glu Gln Ala Leu Asn Glu Val
 565 570 575
 Pro Lys Asp Leu Asn Arg Tyr Thr Ala Glu Ser Val Thr Ala Val Lys
 580 585 590
 Glu Ala Glu Lys Ala Ile Arg Ser Leu Asp Ser Asn Leu Ser Arg Ala
 595 600 605
 Gln Gln Asp Thr Ile Asp Gln Ala Ile Ala Lys Leu Gln Glu Thr Val
 610 615 620
 Asn Asn Leu Thr Leu Thr Pro Glu Ala Gln Lys Glu Glu Glu Ala Lys
 625 630 635 640
 Arg Glu Val Glu Lys Leu Ala Lys Asn Lys Val Ile Ser Ile Asp Ala
 645 650 655
 Gly Arg Lys Tyr Phe Thr Leu Asn Gln Leu Lys Arg Ile Val Asp Lys
 660 665 670
 Ala Ser Glu Leu Gly Tyr Ser Asp Val His Leu Leu Leu Gly Asn Asp
 675 680 685
 Gly Leu Arg Phe Leu Leu Asp Asp Met Thr Ile Thr Ala Asn Gly Lys
 690 695 700
 Thr Tyr Ala Ser Asp Asp Val Lys Lys Ala Ile Ile Glu Gly Thr Lys
 705 710 715 720
 Ala Tyr Tyr Asp Asp Pro Asn Gly Thr Ala Leu Thr Gln Ala Glu Val
 725 730 735
 Thr Glu Leu Ile Glu Tyr Ala Lys Ser Lys Asp Ile Gly Leu Ile Pro
 740 745 750
 Ala Ile Asn Ser Pro Gly His Met Asp Ala Met Leu Val Ala Met Glu
 755 760 765
 Lys Leu Gly Ile Lys Asn Pro Gln Ala His Phe Asp Lys Val Ser Lys
 770 775 780
 Thr Thr Met Asp Leu Lys Asn Glu Glu Ala Met Asn Phe Val Lys Ala
 785 790 795 800
 Leu Ile Gly Lys Tyr Met Asp Phe Phe Ala Gly Lys Thr Lys Ile Phe
 805 810 815

Asn Phe Gly Thr Asp Glu Tyr Ala Asn Asp Ala Thr Ser Ala Gln Gly
 820 825 830

Trp Tyr Tyr Leu Lys Trp Tyr Gln Leu Tyr Gly Lys Phe Ala Glu Tyr
 835 840 845

Ala Asn Thr Leu Ala Ala Met Ala Lys Glu Arg Gly Leu Gln Pro Met
 850 855 860

Ala Phe Asn Asp Gly Phe Tyr Tyr Glu Asp Lys Asp Asp Val Gln Phe
 865 870 875 880

Asp Lys Asp Val Leu Ile Ser Tyr Trp Ser Lys Gly Trp Trp Gly Tyr
 885 890 895

Asn Leu Ala Ser Pro Gln Tyr Leu Ala Ser Lys Gly Tyr Lys Phe Leu
 900 905 910

Asn Thr Asn Gly Asp Trp Tyr Tyr Ile Leu Gly Gln Lys Pro Glu Asp
 915 920 925

Gly Gly Gly Phe Leu Lys Lys Ala Ile Glu Asn Thr Gly Lys Thr Pro
 930 935 940

Phe Asn Gln Leu Ala Ser Thr Lys Tyr Pro Glu Val Asp Leu Pro Thr
 945 950 955 960

Val Gly Ser Met Leu Ser Ile Trp Ala Asp Arg Pro Ser Ala Glu Tyr
 965 970 975

Lys Glu Glu Glu Ile Phe Glu Leu Met Thr Ala Phe Ala Asp His Asn
 980 985 990

Lys Asp Tyr Phe Arg Ala Asn Tyr Asn Ala Leu Arg Glu Glu Leu Ala
 995 1000 1005

Lys Ile Pro Thr Asn Leu Glu Gly Tyr Ser Lys Glu Ser Leu Glu Ala
 1010 1015 1020

Leu Asp Ala Ala Lys Thr Ala Leu Asn Tyr Asn Leu Asn Arg Asn Lys
 1025 1030 1035 1040

Gln Ala Glu Leu Asp Thr Leu Val Ala Asn Leu Lys Ala Ala Leu Gln
 1045 1050 1055

Gly Leu Lys Pro Ala Val Thr His Ser Gly Ser Leu Asp Glu Asn Glu
 1060 1065 1070

Val Ala Ala Asn Val Glu Thr Arg Pro Glu Leu Ile Thr Arg Thr Glu
 1075 1080 1085

Glu Ile Pro Phe Glu Val Ile Lys Lys Glu Asn Pro Asn Leu Pro Ala
 1090 1095 1100

Gly Gln Glu Asn Ile Ile Thr Ala Gly Val Lys Gly Glu Arg Thr His
 1105 1110 1115 1120

Tyr Ile Ser Val Leu Thr Glu Asn Gly Lys Thr Thr Glu Thr Val Leu
 1125 1130 1135
 Asp Ser Gln Val Thr Lys Glu Val Ile Asn Gln Val Val Glu Val Gly
 1140 1145 1150
 Ala Pro Val Thr His Lys Gly Asp Glu Ser Gly Leu Ala Pro Thr Thr
 1155 1160 1165
 Glu Val Lys Pro Arg Leu Asp Ile Gln Glu Glu Glu Ile Pro Phe Thr
 1170 1175 1180
 Thr Val Thr Cys Glu Asn Pro Leu Leu Leu Lys Gly Lys Thr Gln Val
 1185 1190 1195 1200
 Ile Thr Lys Gly Val Asn Gly His Arg Ser Asn Phe Tyr Ser Val Ser
 1205 1210 1215
 Thr Ser Ala Asp Gly Lys Glu Val Lys Thr Leu Val Asn Ser Val Val
 1220 1225 1230
 Ala Gln Glu Ala Val Thr Gln Ile Val Glu Val Gly Thr Met Val Thr
 1235 1240 1245
 His Val Gly Asp Glu Asn Gly Gln Ala Ala Ile Ala Glu Glu Lys Pro
 1250 1255 1260
 Lys Leu Glu Ile Pro Ser Gln Pro Ala Pro Ser Thr Ala Pro Ala Glu
 1265 1270 1275 1280
 Glu Ser Lys Val Leu Pro Gln Asp Pro Ala Pro Val Val Thr Glu Lys
 1285 1290 1295
 Lys Leu Pro Glu Thr Gly Thr His Asp Ser Ala Gly Leu Val Val Ala
 1300 1305 1310
 Gly Leu Met Ser Thr Leu Ala Ala Tyr Gly Leu Thr Lys Arg Lys Glu
 1315 1320 1325

Asp

<210> 167
 <211> 825
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 167
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 cagaaaaaac aagcgtctga agctcctagt caagcattgg cagagagtgt cttaacagac 180
 gcagtcaaga gtcaaataaa ggggagctctg gaggtggaatg gctcaggtgc ttttatcgctc 240
 aatggtaata aaacaaatct agatgccaaag gtttcaagta agccctacgc tgacaataaa 300
 acaaagacag tgggcaagga aactgttcca accgtagcta atgccctctt gtctaaggcc 360
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gggtggcatc aggtcaagaa tctaaagggc tcttataccc atgcagtcga tagagggtcat 480
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 aaaaacattg ctgttcagac agcctgggca aatcaggcac aagccgagta ttcgactggg 600
 caaaactact atgaaagcaa ggtgcgtaaa gccttgacc aaaacaagcg tgtccgttac 660
 cgtgtaaccc tttactacgc ttcaaacgag gatttagttc cctcagcttc acagattgaa 720
 gccaaagtctt cggatggaga attggaattc aatgttctag ttcccaatgt tcaaaaggga 780
 cttcaactgg attaccgaac tggagaagta actgtaactc agtaa 825

<210> 168

<211> 274

<212> PRT

<213> Streptococcus pneumoniae

<400> 168

Met Asn Lys Lys Thr Arg Gln Thr Leu Ile Gly Leu Leu Val Leu Leu
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Leu Leu Ser Thr Gly Ser Tyr Tyr Ile Lys Gln Met Pro Ser Ala Pro
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Asn Ser Pro Lys Thr Asn Leu Ser Gln Lys Lys Gln Ala Ser Glu Ala
 35 40 45

Pro Ser Gln Ala Leu Ala Glu Ser Val Leu Thr Asp Ala Val Lys Ser
 50 55 60

Gln Ile Lys Gly Ser Leu Glu Trp Asn Gly Ser Gly Ala Phe Ile Val
 65 70 75 80

Asn Gly Asn Lys Thr Asn Leu Asp Ala Lys Val Ser Ser Lys Pro Tyr
 85 90 95

Ala Asp Asn Lys Thr Lys Thr Val Gly Lys Glu Thr Val Pro Thr Val
 100 105 110

Ala Asn Ala Leu Leu Ser Lys Ala Thr Arg Gln Tyr Lys Asn Arg Lys
 115 120 125

Glu Thr Gly Asn Gly Ser Thr Ser Trp Thr Pro Pro Gly Trp His Gln
 130 135 140

Val Lys Asn Leu Lys Gly Ser Tyr Thr His Ala Val Asp Arg Gly His
 145 150 155 160

Leu Leu Gly Tyr Ala Leu Ile Gly Gly Leu Asp Gly Phe Asp Ala Ser
 165 170 175

Thr Ser Asn Pro Lys Asn Ile Ala Val Gln Thr Ala Trp Ala Asn Gln
 180 185 190

Ala Gln Ala Glu Tyr Ser Thr Gly Gln Asn Tyr Tyr Glu Ser Lys Val
 195 200 205

Arg Lys Ala Leu Asp Gln Asn Lys Arg Val Arg Tyr Arg Val Thr Leu
 210 215 220

Tyr Tyr Ala Ser Asn Glu Asp Leu Val Pro Ser Ala Ser Gln Ile Glu
 225 230 235 240

Ala Lys Ser Ser Asp Gly Glu Leu Glu Phe Asn Val Leu Val Pro Asn
 245 250 255

Val Gln Lys Gly Leu Gln Leu Asp Tyr Arg Thr Gly Glu Val Thr Val
 260 265 270

Thr Gln

<210> 169

<211> 225

<212> DNA

<213> Streptococcus pneumoniae

<400> 169

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 ggtttaatgg taggttatgg aatcttgggc aagggtcaag atccatgggc tatcctgtct 180
 ccagcaaat ggcaggaatt gattcataaa tttacaggaa attag 225

<210> 170

<211> 74

<212> PRT

<213> Streptococcus pneumoniae

<400> 170

Val Leu Arg Phe Ser Gly Leu Arg Gln Val Met Lys Met Asn Lys Lys
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Ser Ser Tyr Val Val Lys Arg Leu Leu Leu Val Ile Ile Val Leu Ile
 20 25 30

Leu Gly Thr Leu Ala Leu Gly Ile Gly Leu Met Val Gly Tyr Gly Ile
 35 40 45

Leu Gly Lys Gly Gln Asp Pro Trp Ala Ile Leu Ser Pro Ala Lys Trp
 50 55 60

Gln Glu Leu Ile His Lys Phe Thr Gly Asn
 65 70

<210> 171

<211> 40

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 171
cgagatctga tatctcacia acagataacg gcgtaaatag 40

<210> 172
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 172
gaagatcttc cccgggatca caaacagata acggcgtaaa tag 43

<210> 173
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 173
cgagatctga tatccatcac aaacagataa cggcgtaaata ag 42

<210> 174
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 174
cgggatcctt atggacctga atcagcgcttg tc 32

<210> 175
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 175
ggatgctttg tttcaggtgt atc 23

<210> 176
<211> 82
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 176

catgatatcg gtacctcaag ctcatatcat tgtccggcaa tgggtgtgggc tttttttggt 60
ttagcggata acaatttcac ac 82

<210> 177

<211> 81

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 177

gcggatcccc cgggcttaat taatgtttaa aactagtcg aagatctcgc gaattctcct 60
gtgtgaaatt gttatccgct a 81

<210> 178

<211> 24

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 178

cgccagggtt ttcccagtca cgac 24

<210> 179

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 179

tcaggggggc ggagcctatg 20

<210> 180

<211> 22

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 180

tcgtatgttg tgtggaattg tg 22

<210> 181
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 181
tccggctcgt atgttggtg gaattg

26

<210> 182
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<221> SITE
<222> (3)
<223> Xaa=Any amino acid

<220>
<223> Description of Artificial Sequence: Cell wall
anchoring motif

<400> 182
Leu Pro Xaa Thr Gly
1 5

<210> 183
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 183
gcgggatccg ccaccatg

18

<210> 184
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 184
ttgcggccgc

10

<210> 185

<211> 43
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 185
 cggatccgcc accatgggtc taattgaaga cttaaaaaat caa 43

 <210> 186
 <211> 36
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 186
 ttgcgccgc caatgctaga ctaaacacaa gactca 36

 <210> 187
 <211> 36
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 187
 cgcggatcca tgaaaaaat ctattcattt ttagca 36

 <210> 188
 <211> 38
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 188
 ccctcgaggg ctacttccga tacattttaa actgtagg 38

 <210> 189
 <211> 35
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 189
 cggatccgcc accatgagtc atgctgctgc aaatg 35

<210> 190
 <211> 32
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 190
 ttgcggccgc ataccaaacg ctgacatcta cg 32

 <210> 191
 <211> 38
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 191
 cggatccgcc accatgcaaa aagagcggta tggttatg 38

 <210> 192
 <211> 30
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 192
 ttgcggccgc acccccattc ttaatccctt 30

 <210> 193
 <211> 40
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

 <400> 193
 cggatccgcc accatggagg tatgtgaaat gtcacgtaaa 40

 <210> 194
 <211> 32
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: Primer

<400> 194
ttgcggccgc ttttacaaag tcaagcaaag cc

32

<210> 195
<211> 48
<212> PRT
<213> Streptococcus pneumoniae

<400> 195
Gly Ile Arg Leu Arg Asn Met Leu Phe Lys Ile Trp Pro Ala Val Ala
1 5 10 15
Leu Val Thr Ser Ser Gly Asn Asn Val Ser Met Leu His Ser Ile Ala
20 25 30
Asn Met Gly Gln Leu Thr Leu Gly Thr Gln Cys Gln Thr Val Val Val
35 40 45

<210> 196
<211> 11
<212> PRT
<213> Streptococcus pneumoniae

<400> 196
Gln Lys Ile Thr Met Ile Thr Phe Thr Phe Gln
1 5 10